Settlement dynamics on the Cannerberg  
(Maastricht, the Netherlands)  

Archaeological Research of Bandkeramik and Iron Age settlements  

I.M. van Wijk (ed.)
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In the summer of 2013 a large excavation campaign revealed the layout of a late Bandkeramik settlement on the Cannerberg, just south of the city of Maastricht, near the Belgium border. The Cannerberg is situated on a loess-covered upper terrace formed by the River Meuse during the Pleistocene. It is bordered on its eastern side by a steep drop (height difference of 50 m to the valley of the Jeker/Geer, and on the western side the upper terrace gently merges with the middle terrace. The geographical location of the settlements is atypical, since most of the Dutch LBK settlements are situated on the middle terraces, with the exception of several younger ones on the eastern side of the Meuse. The research was carried out by Archaeological Research Leiden BV (Archol) in combination with the Faculty of Archaeology of Leiden University, the National Museum of Antiquities, KF InHeritage and many others.

Due to the tunnelling of the A2 national motorway that splits the city of Maastricht in two, compensation was needed for the loss of natural elements during the building process. The Projectbureau A2 and the city of Maastricht selected the Cannerberg as a compensation area. This area will be forested and connected with the so-called Millennium Forest. The planting of a large body of trees would threaten expected archaeological remains in the area. Per the Valletta Treaty, the city of Maastricht demanded a large test trenching campaign to examine if any archaeological remains were present and how they were preserved. This research was carried out in the winter of 2013. During this campaign it became clear that the area contained a well-preserved Neolithic cultural landscape as well as remains dating from the Iron Age and Roman Period.

Based on test trenching, the structure of the settlement was thought to have an open layout. This contrasts with most Dutch LBK settlements such as Elsloo, Stein and Sittard. These are “high density” settlements that were inhabited from the early LBK onwards and yielded many house plans. The indications for a more open distribution of houses at Cannerberg made it a fine example for focusing on the house yards and settlement structure.

In total 3.5 ha were excavated, revealing the outlines of a small Bandkeramik village, encompassing at least 29 house yards. Based on the pottery chronology it is thought that 4 to 5 house yards were present during each (ceramic) phase. The site has been dated to the Younger and Youngest phases of the Bandkeramik: phase 1d-2a. The house yards cluster and move across the settlement area. The house structures themselves are oriented east to west and consist merely of Modderman Type 2 houses. These are two prominent features that distinguish this site from other known settlements in the Netherlands and the Graetheide settlement cluster, since most Dutch LBK settlements have a wider range of house types and most of the houses are orientated northeast to southwest. There seems to be little difference in material culture compared to other sites. Pottery, flint and stone tools typically conform to regional LBK standards. What was most striking, however, was the enormous amount of flint that was present within three large refuse pits. They resemble the flint blade production workshops from Verlaine-Petit Paradis and the settlement therefore may have played a comparable important role in social and economic distribution networks. One of the main research questions focused on the origin of the flint raw material. The nearby valley of the Jeker/Geer came into view as a possible location for raw material. Research involving GIS analysis and stratigraphical plots could establish if flint-bearing outcrops along the Meuse and the Jeker/Geer were accessible during the early Neolithic.
It is clear that the Cannerberg settlement already holds a special place within the Dutch Bandkeramik. This is not only based on its flint blade industry, but also because of its striking geographical position, settlement structure and occupation dynamics.

At various locations on the Cannerberg, habitation traces dating from the Late Bronze Age to the Middle Iron Age were recovered during the test trenching campaign. The excavation yielded several Iron Age house plans representing various yards. The Roman Period site consists of a few postholes, pits, a ditch and a find layer. The scarce number of features provides little information as to the presumed character of the site, probably a rural settlement.

During the test trenching campaign several locations on the Cannerberg yielded habitation traces which could be roughly dated to the Late Bronze Age and Iron Age. A number of these locations were subsequently excavated and yielded various yards consisting of house plans and associated outbuildings and pits. The yards could be dated to the Early Iron Age and first half of the middle Iron Age (ca. 800-400 BC).

The Cannerberg is one of the first settlements on the loess soils of Southern Limburg to yield clear Iron Age houseplans. An absence of large houseplans had led some researchers to conclude that different housebuilding traditions existed in this region. The excavation on the Cannerberg as well as an excavation in nearby Bilzen (Belgium) has shown that large houseplans do exist after all and are typologically comparable to house plans found on the sandy soils to the north. The excavation results also question the model of wandering farmsteads which is usually put forward when discussing Iron Age settlement systems. The Cannerberg was continuously occupied for several hundred years. This implies there was no need to move the farmstead in search of fresh soils for new fields, which is the usual explanation for the phenomenon of wandering farmsteads.

In addition to the Early Iron Age farmyards a large ditch with a V-shaped cross-section was found which has been dated to the Late Iron Age. The location of this ditch is remarkable as it cuts off a spit of land protruding from the Cannerberg. A possible interpretation for this ditch is that we are dealing with a simple type of fortified settlement which are well known from the Late Iron Age.

The excavation yielded a small number of Roman period features among them a partial house plan and several pits and ditches. The features date between AD 50 and 150 and probably represent a small rural settlement, several of which have been excavated in the area surrounding Maastricht. They differ from the well known villa’s in that no stonebuilt buildings are present on these sites. It is unknown however whether these rural settlements represent a different type of site or did not exist long enough to develop into a villa.

More recent periods are represented by remains dating to the Dutch War of Independence against Phillip II of Spain (1566-1648) or later. Long elongated ditches probably relate to one of the sieges of Maastricht. In addition earthworks belonging to a fortification dating to 1632 built by Prince Frederik Hendrik, the sovereign Prince of Orange were identified on a digital elevation model. During the Second World War the caves in the Cannerberg were used for industrial purpose by the German occupying forces. Remains of allied fire bombs (incendiary cluster bombs) were found scattered over Cannerberg, but it uncertain whether these represent a deliberate bombing of the area or the dumping of excess bombs by an allied plane returning from a bombing raid in Germany.
1 Introduction

Ivo van Wijk

1.1 Introduction

In the winter of 2012 and summer of 2013 an archaeological research project took place at the Cannerberg, a hill slope which lies just south of the city of Maastricht in the province of Limburg, near the Belgian border. The research was carried out by Archaeological Research Leiden BV (ARCHOL) in combination with the Faculty of Archaeology of Leiden University, the National Museum of Antiquities, KF InHeritage and many others.

1.1.1 Cause

Due to the tunnelling of the A2 national motorway that splits the city of Maastricht in two, compensation was needed for the loss of natural elements during the building process. The Projectbureau A2 Maastricht and the city of Maastricht selected the Cannerberg as a compensation area. This area will be forested and connected with the so-called Millennium Forest. The planting of a large body of trees threatens the expected archaeological remains in the area. To examine whether any archaeological remains were present and how they were preserved, following the Valletta Treaty the city of Maastricht demanded a large test trenching campaign. This research was carried out in the winter of 2013. During the campaign the area revealed a preserved Neolithic cultural landscape which also contained remains dating from the Iron Age and Roman Period.¹

1.1.2 Location

The research area is situated on the southern part of the Cannerberg, also named Louwberg, and was called Maastricht-Millenniumbos. The area measures circa 7 acres and is primarily used for agriculture. In the near future this agricultural land will be converted into a forest: the Hoogcannerbos, which connects two different stretches of forest: Millenniumbos and Cannerbos (Figure 1.1). The Cannerberg is situated on a loess-covered upper terrace formed by the River Meuse during the Pleistocene. It is bordered on its eastern side by a steep drop (height difference of 50 metres) to the valley of the Jeker/Geer. On the western side the upper terrace gently slopes down to the middle terrace. The test trenching campaign showed that the research area yielded a lot of potential for archaeological research and would add substantial knowledge about the region.

The archaeological remains consisted of (1) an early Neolithic settlement belonging to the Linear Bandkeramik Culture (further referred to as Bandkeramik or LBK), (2) a Late Prehistoric (Late Bronze Age/Iron Age) settlement and (3) part of the so-called villa landscape dating to the Roman Period. The research area therefore had to be preserved against any future disruptive developments (decision by the Municipality of Maastricht dated 15-01-2013). Adjustment of the planned developments was simulated but proved to be impossible as the remains were too widespread: an archaeological excavation was required.

¹ Van Wijk & Meurkens 2014.
According to the demands and wishes of the local authorities, the mandator (Projectbureau A2 Maastricht) choose to organise a public tender (Design and Construct) with a task-based budget. The archaeological research needed to be carried out in accordance with the Quality Standards for Dutch Archaeology (KNA 3.3) and local heritage demands. One of these demands stated that the research needed to be proportionate in terms of knowledge-cost ratio. The goal of the local authorities was to promote the notion of the importance of the LBK for this region, specifically the city of Maastricht.

1.2 Project outline and organisation

1.2.1 Research framework

The research area is representative of the cultural landscape of southern Limburg, which harbours many archaeological monuments. The extent of the area, positioned on an elevated terrain next to a valley and high archaeological expectations makes it suitable for a landscape archaeological approach. For this research, landscape archaeology is defined as integrated archaeological, geographical and ecological research. It focuses on the development, habitation and use of the cultural and natural landscape during a large time span with attention to coherence between these different aspects of the landscape. Synthesizing research is needed for knowledge gain in this matter.

The research tunes in on research questions formulated for the region\(^2\) and national archaeological themes as presented in the National Research agenda for Archaeology (NOaA) and the Scientific research framework for the municipality of Maastricht (WOK).\(^3\) The goal of this research was to fill in existing knowledge gaps.

The research area has a high density of early and late prehistoric sites with possible occupation continuity until the Roman Period. It offers great possibilities for research

\(^2\) Van der Gaauw 2008.
\(^3\) Hessing et al. 2008.

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**Figure 1.1**

Photographical overview of the research area. The trees of Hoogcannerbos are simulated (source Limburgs Landschap).
The introduction into the earliest agrarian communities. The potential knowledge gain, based on the test trenching campaign may be described as follows:

- Neolithic, late prehistoric and Roman sites lay scattered across the research area but seem to be positioned with respect to each other with hardly any spatial overlap. Together with the extents of the area it offers a unique chance to gain insight into the diachronic and synchronic use of the landscape on a local and micro-regional level.
- The results of the test trenching campaign point to a high potential for finding structural domestic remains dating to the early Neolithic, late prehistory and Roman Period.
- The presence of ‘wet’ contexts such as natural springs and residual fills near the edges of the research area which possibly date to prehistory and the Roman Period stress the need for research into vegetation developments, food procurement and the relationship between man and environment in time.
- Recent research into Bandkeramik settlements at the site of Maastricht-Lanakerveld⁴ and reviewed excavations of Maastricht-Klinkers and Maastricht-Belvédère⁵ which are situated just north of Maastricht, show a more ‘composed’ image of Bandkeramik settlements. They have a lower feature density than Bandkeramik sites from the Graetheide plateau, east of the Meuse river. House yards seem to be more spaciously positioned.
- For the Cannerberg site, more insights may be gained by focusing on the structure of a single Bandkeramik house yard. In general it is difficult to analyse this due to the aforementioned high feature density character of Graetheide sites. Important questions regarding yard structure, chronology and classification of the cultural landscape in terms of raw material use may be addressed.
- Pits, rich in finds, from ‘isolated’ house yards not only offer potential for comparative studies between contemporaneous house yards but also for house

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5 Van Wijk et al. 2014.
yards from other LBK settlements. The main focus is on the source of flint in relation to known flint outcrops in the nearby valley of the Jeker river. In contrast to most of the Dutch Bandkeramik settlements, the settlement at the Cannerberg is located close to flint outcrops. The question is whether these outcrops were used and what kind of conclusions could be drawn as to material culture and social organization.

- Iron Age habitation seems to be subject to great variation when regarding sites like Beek-Maastricht Aachen Airport\(^6\), Geleen-Hof van Limburg\(^7\) and Sittard-Hoogveld\(^8\). Questions regarding yard structure still remain unanswered and the idea of ‘wandering yards’\(^9\) is still debatable for this region.

- Ultimately the question remains how the cultural and natural landscape were used and structured in time. Important natural factors are the location on a plateau which stands out in the landscape, the presence of water sources and access to flint outcrops. Other environmental and social factors for prehistoric and Roman habitation have to be taken into account such as presence and access to raw materials, other settlements, and infrastructure. How was the site location choice influenced by these factors?

1.2.2 Research theme

For this project a broad scientific research framework was proposed: developments in habitation and relationship with the landscape.

The following themes were formulated to provide a more practical framework:

- The cultural landscape comprises many facets such as: the physical landscape, the history of initial exploitation, infrastructure, and vegetation. As each facet is normally studied within its own discipline, interdisciplinary research is needed. Traditionally, collaboration is sought between physical geography, soil and historical geography, and paleobotany sciences.

- Landscape research focuses on wide-scale developments. The cultural landscape aside from the settlement is the focus of our research. Special attention is paid to settlement borders, streams and infrastructure.

- Past agricultural societies were in close contact with each other through trade and exchange and experienced mutual influences on social, economical and cultural levels. Known Bandkeramik settlements in the region around Maastricht are well suited for exploring this theme. To gain more insight into these contacts, attention will mainly be paid to analysing the material culture. However, for other cultural periods, attention will focus on technical aspects of structures, infrastructure and subdivision of the landscape.

- When studying past regional habitation developments, contemporary research within the micro region will be addressed. The current research will be compared with other, recently published, research like that of the Odyssey project\(^10\), allowing for a valuable synthesis.

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\(^{6}\) Tichelman 2010.
\(^{7}\) Van Hoof et al. 2012.
\(^{8}\) Tol & Schabbink 2004.
\(^{9}\) Schinkel 1998.
\(^{10}\) Van Wijk et al. 2014.
1.2.3 Project outline: research questions

According to the Quality Standards for Dutch archaeology Malta-induced research has to comply with the national standards of the KNA 3.3 and the Project Outline. The Project Outline is a notification by the competent authority to the archaeological contractor, and refers to the preservation value of the site and the necessity of excavation work in the event that the site cannot be preserved. In addition, requirements are formulated and provisions prescribed with which the activities have to comply. The Project Outline is the basis on which archaeological work has to be carried out. For both the test trenching campaign\(^{11}\) and the excavation a Project Outline\(^{12}\) was available. The associated research questions (in Dutch) are presented in Appendix 1.

The research questions are closely connected to the three main aspects of the research carried out: (1) the cultural landscape, (2) the yard and (3) the house.

1.2.4 Research goals

The main goal of this research is to gain more insight into the prehistoric and Roman cultural landscape around Maastricht. The main focus of attention will be not only on dense clusters of features and find spots but also on neighbouring zones and zones that lie in between (off-site).

Based on the mentioned potential of the site, defined time frame and research themes, a number of goals are formulated which evolve around the central theme of a cultural landscape approach:

- Gain insight into the use and structuring of the landscape, settlement, activity areas and depositions by research of spatial dispersions of anthropogenic features and find material, both horizontally and vertically, ascertaining patterns and describing and interpreting quantitative and qualitative characteristics of these patterns.
- Better understand decisive factors which play a role in the choice of the Cannerberg as living, habitation and work environment by past societies.
- Gain insight into the nature of subsistence strategies.
- Improve our knowledge of characteristics and chronological aspects of the material culture as well as developments in typology, technology and raw materials use.
- Test and complement existing concepts about the chronological aspects and developments in Bandkeramik pottery.
- Gain insight into the environmental setting during habitation on the Cannerberg and human impact on the vegetation.
- Frame the research results in a wider chronological and regional perspective.
- Qualify and quantify (assess) degradation of the soil archive.

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11 Bente 2012.
12 Van Wijk 2013.
1.2.5 Administrative data

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<td>drs I.M. van Wijk</td>
</tr>
<tr>
<td>Authors</td>
<td>drs I.M. van Wijk, drs L. Meurkens, prof. C.C. Bakels, dr P. van de Velde, drs A. Verbaas, dr S. Knippenberg, dr J. de Moor, drs W. Laan, and M. Goddijn MA</td>
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<td>drs T.A. Goossens</td>
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<td>Mandator</td>
<td>Projectbureau A2 Maastricht/Municipality of Maastricht/Avenue A2 Maastricht</td>
</tr>
<tr>
<td>Approval mandator</td>
<td>dr R. Isarin</td>
</tr>
<tr>
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<td>Municipality of Maastricht</td>
</tr>
<tr>
<td>Approval Authorities</td>
<td>drs G. Soeters (Municipality of Maastricht)</td>
</tr>
</tbody>
</table>

1.2.6 Organisation

Prospection team 2012:
- drs Ivo van Wijk
- drs Lucas Meurkens
- Adé Porreij-Lyklema MA
- Michiel Goddijn MA
- Sjoerd Aarts BA (volunteer)
- Ton Luyten (excavator)

Excavation team 2013:
- Archol:
  - drs Ivo van Wijk
  - drs Cristian van de Linde
  - drs Lucas Meurkens
  - Pepijn van de Geer MA
  - Adé Porreij-Lyklema MA
  - Judith van der Leije MA
  - dr Sebastiaan Knippenberg
  - Marleen van Zon MA
- Scientific committee:
  - dr Luc Amkreutz (National Museum of Antiquities)
  - Prof. dr Corrie Bakels (Leiden university)
  - dr David Fontijn (Leiden university)
  - drs Richard Jansen (Leiden university)
  - dr Karin Jeneson (Thermen museum)
  - dr Pieter van de Velde (Leiden university)
- Mechanical excavation: Luyten Archeologisch Grondwerk
1.3 Style guide

This report encompasses the results of the excavation as well as the test trenching phase. Although the results of the test trenching have been published earlier\textsuperscript{13}, we wish to publish the results together in this volume.

This report is divided into five parts: the first part (chapters 2-6) provides the administrative, methodological, archaeological (test trenching), historical and environmental framework. The results of the excavation of the early Neolithic habitation are presented in part 2 (chapters 7-11). It includes an extensive analysis of intra-site structure (chapter 7) as well as a detailed analysis of the Bandkeramik pottery (chapter 8), flint and flint resources (chapter 9) and stone artefacts (chapter 10). Archaeobotanical data is presented in chapter 11. Part 3 (chapters 12-14) is dedicated to the Iron Age habitation with an intra-site analysis of the Iron Age features in chapter 12. Chapter 13 presents the results from the various analyses of pottery, stone, metal objects and other artefacts. Chapter 14 discusses the results from the archaeobotanical analysis. Part 4 (chapters 15-17) describes the results from the Roman era (chapters 15 and 16) and Modern Times including traces dating to WWII (chapter 17). Finally, a synthesis is provided in part 5 (chapter 18), where the cultural biography of the Cannerberg is summarized and discussed on a supra-regional level.

\textsuperscript{13} Van Wijk & Meurken 2014.
2 Research strategy, methodology and techniques

Ivo van Wijk

2.1 Introduction

The Cannerberg project consisted of two field campaigns: a short test trenching campaign in 2012 and a large excavation campaign in 2013. The test trenching campaign and excavation were completed conformance of the Project Outline for the test trenching\(^2\) and the excavation.\(^3\) As part of the commercial tender trajectory it was demanded that a strategic plan for the excavation had to be written beforehand. This strategic plan was later on remodelled to a Project Outline.\(^3\)

2.2 Test Trenching

2.2.1 Organisation

The test trenching campaign was carried out by a team of archaeologists with sufficient regional experience. The team consisted of a senior archaeologist as well as two field archaeologists, and a tracked mechanical excavator with driver (Table 2.1). The team was supplemented with one local volunteer.

Material specialists were added during the analysing phase.

<table>
<thead>
<tr>
<th>Contributor</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drs T. Goossens</td>
<td>Project leader</td>
</tr>
<tr>
<td>Drs L. Meurkens</td>
<td>Senior KNA-archaeologist, prehistoric pottery and late prehistory specialist</td>
</tr>
<tr>
<td>Drs I.M. van Wijk</td>
<td>Senior KNA-archaeologist, specialist Neolithic</td>
</tr>
<tr>
<td>M. Goddijn (MA)</td>
<td>KNA-archaeologist, Medieval pottery</td>
</tr>
<tr>
<td>A. Porreij-Lyklema (MA)</td>
<td>KNA-archaeologist, Metal detection</td>
</tr>
<tr>
<td>S. Aarts BA</td>
<td>Volunteer</td>
</tr>
<tr>
<td>Dr S. Knippenberg</td>
<td>Specialist lithics</td>
</tr>
<tr>
<td>Dr J. de Moor</td>
<td>Physical geographer [Earth Integrated Archaeology]</td>
</tr>
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</table>

2.2.2 Strategy

The fieldwork was carried out from November 26 until December 5, 2012. In total 5120 m\(^2\) of the 7 ha large research area has been trenched. Beforehand 45 test trenches were allotted in a staggered grid (method Lorraine). Based on LIDAR images 42 trenches with a length of 25 m and a width of 4 m were north-south orientated (Figure 2.1). Three east-west orientated trenches with a length of 50 m and a width of 4 m were dug to gain more insight into soil formation processes and the physical landscape.

The test trenching campaign was preceded by a scan for conventional explosives by the firm Leemans Speciaalwerken B.V. In the end only 43 out of 45 trenches could be dug, excluding trenches 3 and 15. In some cases trenches have been shortened or relocated (Figure 2.3). No explosives were found or retrieved during this part of the campaign.

\(^1\) Bente 2012.  
\(^2\) Van Wijk 2013.  
\(^3\) Van Wijk 2013.
Figure 2.1
Original trench plan with corresponding trench numbers.
A second plane was dug in two of the trenches to find out whether the feature visibility improved at a deeper level. This was the case for trench 13 where the plane was lowered by 5-10 cm. In trench 22 no additional features were found when lowering the archaeological plane.

The potential presence of conventional explosives restricted the research as it was impossible to extend outside the already scanned trenches. In some cases it proved to be difficult to get a firm grip on clusters of features and therefore more insight into the character of the sites. In general the high archaeological value of the research area could be ascertained.

### 2.2.3 Physical geography

To obtain a proper overview of the landscape and soils, soil profiles were documented in all trenches during the test trench research (Figure 2.2). The profile sections were 1 metre wide and dug approximately 30 cms below the archaeological plane. Documentation consisted of a photograph and a drawing (scale 1:20). The top of the profile was measured with a robotic Total Station (rTS).

A reference loess or loam soil profile description was used to describe the different soil layers. Each different layer was assigned a unique feature number to facilitate the analysis (Table 2.2). The soil profiles gave insight into the degree of conservation of the archaeological site.

<table>
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<tr>
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<th>Description</th>
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</thead>
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<tr>
<td>S5000/5005</td>
<td>Top soil / recent plough layer (1Ap)</td>
</tr>
<tr>
<td>S5010</td>
<td>Colluvium (1C)</td>
</tr>
<tr>
<td>S5020/21</td>
<td>B/Bt-Horizon (2Bb/Btb)</td>
</tr>
<tr>
<td>S5025</td>
<td>BC Horizon (2BCb)</td>
</tr>
<tr>
<td>S5030</td>
<td>C-Horizon (loess) (2Cb)</td>
</tr>
<tr>
<td>S5040</td>
<td>C-Horizon (fluvial gravel) (3Cb)</td>
</tr>
</tbody>
</table>

### 2.2.4 Methodology and documentation

All trenches were mechanically dug with the help of an excavator. The stratigraphy was first determined beforehand with a profile section. The excavator carefully lowered the planes in layers, examined with a metal detector.

### 2.2.5 Excavation and documentation of the archaeological plane and features

After digging the trenches, the archaeological features were marked and tagged. The excavation plane was photographed and all features were digitally recorded into the national coordinate grid with a robotic Total station (rTS). After documentation of the archaeological plane, a large selection of features was cross sectioned. This selection focused on features with an unclear nature, being anthropogenic or natural. Natural or recent features were deselected. Concentrations of features (i.e. house structures or pit clusters) or well-dated features were selectively cross sectioned for determining the preservation (remaining depth below surface) and for gathering find material.
Figure 2.2
Location of the profile sections during test trenching.
Figure 2.3
Actual position and numbering of the excavated test trenches with features plotted against the height difference in the archaeological plane.
2.3 Excavation

2.3.1 Organisation

The excavation was carried out by a large team derived mainly from Archol and several other participating organizations. The daily supervision and quality control was done by Archol (Table 2.3). Students from Leiden University participated in the research. The quality of the scientific content was monitored by drs I.M. van Wijk in close collaboration with a Scientific Guidance Committee (Table 2.4). This committee consisted of distinguished archaeologists with adequate expertise and experience. They were consulted on a weekly basis during the excavation and themselves visited the excavation on several occasions. The committee advised on methods, expected scientific output and selection of sites. Some members of the committee functioned as mentors for some of the material specialist during the analysing phase.

<table>
<thead>
<tr>
<th>Member</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>drs T.A. Goossens</td>
<td>Project leader (senior archaeologist)</td>
</tr>
<tr>
<td>drs I.M. van Wijk</td>
<td>Field work leader, specialist Neolithic</td>
</tr>
<tr>
<td>drs L. Meurkens</td>
<td>Replacing Field work leader, specialist late</td>
</tr>
<tr>
<td>dr S. Knippenberg</td>
<td>Prehistory (senior archaeologist)</td>
</tr>
<tr>
<td>drs C. van der Linde</td>
<td>Replacing Field work leader, Lithics specialist</td>
</tr>
<tr>
<td>M. van Zon MA</td>
<td>Field archaeologist</td>
</tr>
<tr>
<td>drs J. van der Leije</td>
<td>Field archaeologist</td>
</tr>
<tr>
<td>A. Porreij-Lyklema MA</td>
<td>Field archaeologist, metal detection</td>
</tr>
<tr>
<td>P. van de Geer MA</td>
<td>Field archaeologist</td>
</tr>
<tr>
<td>M. Gast</td>
<td>Field assistant</td>
</tr>
<tr>
<td>dr J. de Moor</td>
<td>Physical geographer [Earth Integrated Archaeology]</td>
</tr>
</tbody>
</table>

Table 2.3

Members excavation team.

Figure 2.4

Field visit by members of the committee (prof. dr Bakels (right) and dr P. van de Velde (left)
Table 2.4
Members of the Scientific Guidance Committee

<table>
<thead>
<tr>
<th>Member</th>
<th>Function</th>
<th>Organization</th>
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<tr>
<td>prof. dr C.C. Bakels</td>
<td>Archaeobotany, palaeo landscape</td>
<td>Leiden University</td>
</tr>
<tr>
<td>dr P. van de Velde</td>
<td>specialist Linear Bandkeramik, Bandkeramik pottery</td>
<td>Leiden University</td>
</tr>
<tr>
<td>dr M. de Grooth</td>
<td>specialist Linear Bandkeramik, Bandkeramik flint</td>
<td>Independent archaeologist, Bad Münstereifel</td>
</tr>
<tr>
<td>dr D. Fontijn</td>
<td>specialist late Prehistory</td>
<td>Leiden University</td>
</tr>
<tr>
<td>drs R. Jansen</td>
<td>specialist late Prehistory</td>
<td>Leiden University</td>
</tr>
<tr>
<td>dr L. Amkreutz</td>
<td>specialist Neolithic period</td>
<td>National Museum of Antiquities, Leiden</td>
</tr>
<tr>
<td>dr K. Jeneson</td>
<td>specialist Roman Period</td>
<td>Thermenmuseum, Heerlen</td>
</tr>
</tbody>
</table>

2.3.2 Public outreach

Public outreach was one of the key factors of the project. As cultural heritage clearly not only belong to archaeologists, collaboration was sought with the society of amateur archaeologists in Limburg (Archeologische Vereniging Limburg, AVL). By advertising through local and social media, volunteers from Limburg and the rest of the Netherlands were invited to join the excavation. This public outreach got a huge response and in total over 50 volunteers participated. A maximum of 5 volunteers per day were allowed on the excavation, as they needed to be guided and monitored. Most of the volunteers had no experience, but nonetheless proved to be hard and passionate workers: a real addition to the project.

In collaboration with Mr. Kris Förster of KF InHeritage and Mrs. Désirée Florie of the A2 project bureau Maastricht local media were informed about the proceedings. Their news bulletins generated extensive media coverage ranging from television and radio interviews as well as weekly articles in local newspapers. More in depth information was provided by the website: www.bandkeramiek.nl, which was frequently visited.

At the end of the excavation, an exhibition by the National Museum of Antiquities was organised in and with the help of the heritage centre of Maastricht, Centre Céramique. Parts of the exhibition remained at the visitor centre of the A2 project bureau Maastricht until today.

Figure 2.5
The partners of the project at the opening of the exhibition at Centre Céramique. Left to right (standing): Rob Paulussen (LGOG), René Isarin (Crevasse advies), Albert Gerrits (Projectburo A2 Maastricht), Roel Bongaerts (Projectburo A2 Maastricht), Erik Wetzels (Centre Céramique), Luc Amkreutz (RMO), Gilbert Soeters (city of Maastricht), Désirée Florie (Projectburo A2 Maastricht), Louis Prompers (director Projectburo A2 Maastricht), Mikko Kriek (BCL support), Kris Förster (KF InHeritage), Ivo van Wijk (Archol) and (crouched) Wim Dijkman (Centre Céramique)
2.3.3 Strategy

The main aim of this project was to study the relationship between the various sites found in the research area, using a cultural landscape approach. Following the original strategic plan and Project Outline the excavation consisted of three different research phases. The main aim was to excavate circa 3.5 hectares in two distinct phases. Phase 1 consisted of a large-scale site-based research (2.5 ha excavated) and phase 2 focused on yards and clusters (ca. 1 ha excavated). Phase 3 comprised a coring campaign in the Jeker valley in order to get more grip on the prehistoric landscape outside the research area.

The fieldwork was carried out from April 16th until July 5th 2013.

2.3.4 Explosives research

The excavation was preceded by a conventional explosives research in which the research area was cleared of unexploded shells dating to WWII. It turned out that the area had been bombed by the Allies using incendiary bombs. Although precautions were taken to ensure no interventions with the archaeological excavation, some provisions and alterations to the original plan were made.

With a mechanical excavator circa 30 cms of the topsoil of the excavation pits were removed under guidance of an archaeologist. This was to ensure that the archaeological level was left intact. Finds and (first traces of) features were documented. Finds were collected in grids of 20 x 20 m, per find concentration or by potential feature. 3-D measurements of all finds were carried out and subsequently administratively documented as finds from pit 1000 (Figure 2.7).

The pits were manually scanned with metal detectors by AVG and potential explosives were removed and secured. In some cases (especially) Bandkeramik refuse pits yielded a signal for the metal detector which resulted in the disturbance of some Bandkeramik pits. Finds however were collected and left with the dug out ‘explosives’ hole and were recorded after the explosives research.

Figure 2.6
Removal of the top soil.

Figure 2.7
Distribution of finds from pit 1000.
2.3.5 Phase 1: Site-based trenches

Phase 1 consisted of the excavation of nine large trenches which cut through the research area. It verified whether or not the results of the large trenches corresponded to the results of the test trenches. A concern was whether the small density of test trenches which represented merely 7% of the total research area prospected, was sufficient to make any suggestions not only to known site patterns but also to lesser known off-site activity sites. As the excavation results will show, the initial lay-out of the prospected sites proved to be more or less the same, although the distribution and density of the Iron Age features turned out to be more extensive than anticipated. The density of the test trenching therefore proved to be sufficient. It has to be stressed however that interpreting the potential sites and feature distributing forms a key element in the process of selection and deselection.

With two mechanical excavators the pits were deepened to the archaeological plane. The pits were 20 m wide and the length of a number of pits was up to 180 metres.

Figure 2.8
Excavation plan phase 1 with corresponding pit numbers
(Figure 2.8). Each pit was 50 metres long for administrative reasons. This way 31 excavating pits were dug covering a total area of 25,540 m². The pits were north-south orientated and offered an adequate chance for mapping Bandkeramik house structures as they were perpendicular to the orientation of the pits. Due to the length of the pits, a cross section of the total archaeological landscape was provided where settled and unsettled spaces (site or off-site) were revealed.

In combination with the test trenches sufficient information was provided about the character and size of the various sites. Based on this spatial information, as well as the information derived from the actual excavating of features, a detailed site-based research was undertaken (phase 2).

### 2.3.6 Phase 2: Focus on the Bandkeramik and Iron Age settlement

Based on the results of the test trenching campaign and the site-based excavation trenches, find and feature distribution maps were generated. With the Scientific Guidance Committee and local authorities a number of targets for the second phase of the excavation were distinguished:

- Mapping a solitary Bandkeramik yard
- Determining Bandkeramik house types within the settlement
- Determining the different phases of the Bandkeramik settlement
- Determining the relationship between several large Bandkeramik refuse pits filled with flint and its surroundings
- Mapping the extent and phasing of the Iron Age settlement
- Providing context for a pit filled with loom weights dating to the Iron Age
- Complementing and tracing the different ditch systems
- Dating of ditch systems

As mentioned earlier, the excavation had a limited budget which meant that the above-mentioned targets were met by adjusting the field methods in such a way that maximum efficiency was ensured: choices were made, evaluated and adjusted constantly during the campaign.

The preferred methodology was as follows:

- To expand pits at chosen locations (Figure 2.9), totalling ca. 1 ha.
- Selective cross sectioning of features. Long pits and refuse pits were sectioned in half (in segments when necessary). For every structure a number of post holes were cross sectioned in order to establish depth and preservation. Post holes which didn’t seem to have an obvious relation were not cross sectioned unless within a concentration of post holes. Attention was paid to section ‘vague’ features in order to provide solid information about anthropogenic features. Pit features were preferably sectioned by hand. When finds were or remained absent, mechanical sectioning was allowed. Post holes with evident traces were manually drawn; other features were only documented by photograph, while its depth and findings were documented.
- Features of solitary yards and related structures, when recognised during field work, were all to be sectioned. Iron Age structures for storing (so called ‘spiekers’) with 4-8 post holes were only selectively sectioned.
- Sectioning also took place at spots where expansions were realised.
- Phase 3 (coring campaign and reconstructive vegetation research) will focus on the Jeker valley.
During phase 2, 15 excavation pits were dug with a total area of 9545 m². In total 35,085 m² was excavated.

2.3.7 Phase 3: The Valley of the Jeker

The valley of the Jeker lies adjacent to the Cannerberg and its water most probably provided settlements on the Cannerberg with fresh water. The valley formed during the glacial period and gradually filled in with silty sediments. The current valley floor has been gradually raised by this build up. This gave rise to the idea that a Neolithic predecessor of the Jeker, a fossilised meander, could be retraced by coring. The main goal of this coring project was to investigate if activities (for example deforestation and agriculture) related to the LBK site on the Cannerberg were reflected and recorded in fluvial, colluvial sediments and pollen in the valley of the Jeker.

A short coring campaign was carried out on June 4th and 13th 2013. A total of ten corings, using hand auguring systems (the so-called Edelman and gouge augers) was
executed. Corings have been placed in the flat river valley and on the western valley slope (Figure 2.10). Perpendicular to the current location of the Jeker with an interval of approximately 25 m (Figure 2.10). The corings ended when gravel was reached. All corings have been documented according to the standards, complete core descriptions can be found in Appendix 2.

2.3.8 Physical geography

Most of the lithodological and geomorphic research was done during the test trenching campaign when most profile sections were studied. During the excavation no extra profile sections were documented as there seemed to be no notable changes in soil formation in between the area not covered by test trenches. The lithodological research during the excavation focused more on visual observations about soil processes visible on the archaeological plane.

2.3.9 Methodology and documentation

All trenches were mechanically dug by an excavator. The archaeological level was determined by manual profile sections, based on the results of the test-trenching campaign. The top soil was carefully removed until the archaeological level was reached. Metal detectoring took place especially in those parts where late prehistoric or Roman finds were expected.
After the trenches were dug all archaeological features were marked and tagged. The excavation level was photographed and all features were digitally drawn into the national coordinate grid with a robotic Total station (rTS). After documentation of the archaeological level, a selection of features were cross sectioned according to the described methodology as mentioned in sections 2.3.5 and 2.3.6. Apparent natural or recent features were not excavated.

Features
During the excavation 2987 features were documented. A third were labelled as natural or recent disturbances. 1968 features were considered of anthropogenetic origin, 732 of which have been cross sectioned (see Appendix 3). All features were documented in the level before sectioning which means that shape, type, colour and possible cultural period were noted. When features were selected for cross sectioning, depth, filling and relationship to other features were documented.

Finds
In total 33,331 finds were retrieved during test trenching and excavation (see Appendix 4). They yielded a maximum weight of 1,143 kg. Most finds were excavated from features (n=540) with a total of 32,505 finds and a weight of 1,088 kg. It should be mentioned that some of the Bandkeramik refuse pits contained so many flint pieces (splinters) that it was impossible to count the smallest fraction (smaller than 0.5 cm²). After drying, all finds were categorised and split up in different bags.

2.3.10 Sieving program
As a test case the infills of 16 features were sieved on a so-called 'wet sieve system' with a mesh width of 3 mm. Although the sieving allowed us to gather all the finds from a feature, it also provided a problem with the Bandkeramik pottery. Since LBK pottery is generally not fired hot enough, the sherds tend to be too soft when sieved and pushed into the mesh screens of the sieve and therefore creating a unique but unwanted decoration on the sherds. This problem was dealt with by lowering the
water pressure and constantly manually controlling the sieving process and retrieving as many sherds from the residue as possible while sieving. The sieving was extremely useful for refuse pits filled with flint. As hardly any soil was present in the flint-bearing layers, it was nigh impossible to excavate them manually. The disadvantage was that the sieving samples were very large and kept in bin bags which meant that the specific provenience was lost, apart from the layer they were gathered from.
<table>
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<th>Layer Context</th>
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<td>1,177,800.2</td>
</tr>
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Table 2.5: Different find categories within the assemblage.
The natural landscape of South Limburg: soils and geology

Jos de Moor

3.1 Introduction

South Limburg is situated at the transition from the Eifel and Ardennes mountains in the south and southeast to the Lower Rhine and North Sea basins in the north. Since the Carboniferous the area has been under the influence of several geological processes and their associated sedimentary environments. These processes include tectonic uplift, large-scale limestone formation during the Cretaceous, the formation of river terraces and aeolian sedimentation.

3.2 Quaternary: Meuse River

During the Pleistocene, with its glacial (colder) and interglacial (warmer) periods, the Meuse River played an important role in the creation of the (present-day) landscape of South Limburg. During glacial periods, mainly sedimentation of coarse sand and gravel took place and the river had a braided pattern. The interglacial periods were characterized by fine-grained sedimentation and the river had a meandering pattern. During the transition phases (from warm to cold and from cold to warm) and under the influence of tectonic uplift, incision of the Meuse River and its tributaries took place, thereby creating a stepwise pattern of river terraces. The highest and oldest terraces are situated in the south-eastern part of South Limburg and have an Early Pleistocene age. Due to tectonic uplift of the area, the river shifted in north-western direction towards its current position. Numerous smaller and larger tributaries, like the Geul, Jeker and Geleenbeek have created river valleys by incising into the Meuse terraces (this probably took place during the later phases of the Pleistocene, after the Meuse had shifted towards its current position).

3.3 Quaternary: loess

During the last two glacial periods (the Saalian and Weichselian periods) landscape formation was dominated by the deposition of several meters of aeolian loess. The loess created a sort of “blanket”, thereby covering the older Meuse terraces and their stepwise terrace morphology. During the last part of the Pleistocene and during the Holocene soil formation and soil erosion were important landscape-forming factors. Originally, the loess was CaCO$_3$-rich, but under the influence of percolating rainwater the upper 2-3 m of loess sediments have been decalcified. Other soil forming processes in the loess are internal weathering of clay minerals in the B horizon (Cambic or Bw-horizon) and clay illuviation (Argic or Bt horizon) in the B horizon.

Many of the tributary (river) valleys of larger streams in South Limburg have an asymmetrical morphology. They were formed during glacial periods by the process of gelifluction. Nowadays, many of these valleys do not contain permanent running water or active streams anymore and are therefore called “dry valleys”.

1 The downslope movement of waterlogged sediments under the influence of periglacial freeze-thaw processes.
3.4 Holocene: river valley sedimentation and colluvium

The most recent (Holocene) deposits in South Limburg are sediments deposited by brooks, small rivers and colluvial sediments. Incision of the Jeker River into the Meuse terraces took place during the Pleistocene, while during the Holocene sedimentation of fine grained sediments dominated with no further incision (only aggradation of sediments).

Originally loess is a very fertile sediment, but it is also very susceptible to erosion. Due to deforestation and land cultivation, roots of vegetation could no longer hold the loess sediments together and during intense rainfall periods surficial runoff of water and sediments took place, resulting in severe erosion of the slopes and sedimentation in river valleys and at the base of hill slopes (colluvium). Especially during the spring period after ploughing and sowing, the fields (arable land) on slopes are very vulnerable to erosion (see also Figure 3.1). As measures to reduce soil erosion on the loess slopes have been very limited in the past, large amounts of loess have eroded from slopes and gently inclined plateaus, and have been redeposited on lower terrain. This sediment, which is called colluvium, is strongly related to the cultivation of the natural landscape of South Limburg.

For South Limburg, at least two main phases of soil erosion and associated colluvial sedimentation have been recorded. The first phase coincides with the cultivation of the area during the Roman Period and the second phase occurred during the Medieval Period, when large-scale deforestation took place. Colluvial sedimentation probably also took place during pre-Roman periods, as occupation and agriculture on the loess plateaus had already started in the Neolithic. However, the scale of occupation and cultivation was much smaller during the Neolithic than during the Roman and Medieval occupation, so it is likely that the intensity of soil erosion and colluviation was also much more limited.

Figure 3.1
"Fresh" soil erosion in one of the trenches. Soil erosion took place just after a heavy rain shower. This picture clearly indicates the extreme vulnerability of the loess area to soil erosion when vegetation is absent.
The correlation between colluvium formation and cultivation of the area is also revealed by archaeological artefacts that have been found, dating to the Neolithic, late Iron Age, Roman Period and Medieval Period. In the dry valleys and brook valleys, several meters of colluvium may cover archaeological sites, thereby providing a good conservation of the sites, but also making it more difficult to detect them.\(^3\)

Soil maps provide a first indication of the intensity of (past) soil erosion on slopes and plateaus of the loess area in South Limburg. Well-developed soils in the loess area are called “brik” soils and are characterized by the presence of a B horizon with clay illuviation (Bt horizon or argic horizon). The two main types of brik soils found in South Limburg are the bergbrik soil and the radebrik soil. The radebrik soils have a complete, non-truncated soil profile with A-E-Bt-C horizons and are mainly found on the (more or less) flat loess plateaus. The bergbrik soils have a truncated profile with Bt and C horizons and are mainly found on the loess slopes; the A and E horizons of this soil type have been eroded and have often been “replaced” with colluvium.

The soil maps also give an indication of the slope degree, which is expressed in six different inclination classes:
- flat (0-2% slope)
- weakly inclined (2-5%)
- moderately inclined (5-8%)
- strongly inclined (8-16%)
- rather steep (16-25%)
- steep (> 25%)

On slopes with an inclination of 2% or more, soil erosion of the A and E horizons of a brik soil can take place. The Bt horizon of a brik soil (which has a higher clay content and is better resistant against soil erosion) can be eroded on slopes with an inclination of more than 5%.\(^4\)

Truncation of the soil profile can be caused by erosion, but it can also be the result of recent ploughing. Because of this truncation (with the associated disappearance of the prehistoric land surface), conservation of archaeological features can be rather poor. However, traces of features as postholes, water wells or ditches are often still visible in the soil in areas with partly truncated soil profiles like the bergbrik soil (where the Bt horizon is still present). As almost no part of South Limburg is entirely flat, completely non-truncated soils are virtually absent.

### 3.5 Coring transect in the Jeker valley and palaeobotanical research

In addition to the documented soil profiles in the trenches, a coring project was carried out in the valley of the Jeker, the small river east of the excavation site. The main goal of this coring project was to investigate whether activities (for example deforestation and agriculture) related to the LBK site on the Cannerberg are reflected and recorded in fluvial, colluvial sediments and pollen in the valley of the Jeker. The location for the coring transect was selected on the basis of a DEM analysis and inspection in the field. Unfortunately, no residual channel of the Jeker (the preferred location for collecting samples for pollen analyses) was found.

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\(^3\) For example recent research at the site Sittard-Odaparking has revealed a LBK site situated in situ at an old forest soil (Hermsen in prep.).

\(^4\) Modderman 1958/59.
The selected location was characterized by the occurrence of small ditches near the side of the valley. We assumed that these ditches would offer high chances of finding organic sediments in the subsoil, suitable for retrieving sufficient pollen for analyses. Ten corings were carried out, using hand auguring systems (the so-called Edelman and gouge augers). Corings were placed in the flat river valley and on the western valley slope (Figure 3.3). The complete profiles are depicted in Figure 3.4 and Figure 3.5 (lithological profile and lithogenetical profile); complete core descriptions can be found in Appendix 2.
Figure 3.4
Lithological profile of the coring transect.

Figure 3.5
Lithogenetical profile of the coring transect.
Sediments in the valley of the Jeker consist of up to 6 m of fine grained overbank sediments, peat and calcareous silt. The base of the valley infill consists of gravely river bed deposits. Coring data from the DINO database show that this gravel layer may be several meters thick. Below the gravel, bedrock is present. On top of the gravel, a 1 to 1.5 m thick silty clay layer is present, representing overbank sedimentation. On top of these sediments peat and calcareous gyttja are present. The upper 2-2.5 m consists of silty, loess like deposits. Sediments on the valley slope are mainly deposited as colluvium.

The sediments in the river valley represent different periods during the Late Pleistocene and Holocene, with low sedimentation rates during the main part of the Holocene (lower overbank deposits and peat/humic clay). In most cores, a layer of calcareous gyttja was found (Figure 3.6). This layer also represents sedimentation in a stable, low energy environment. According to Felder\(^5\), most of the calcareous gyttja has a late glacial to early Holocene age. During the Late Holocene, sedimentation rates increased, related to deforestation in the catchment.\(^6\)

The results of the pollen analysis\(^7\) demonstrate that the peat started to grow during the Pre-Boreal (early Holocene) and that the calcareous gyttja was deposited during the Boreal and early Atlantic periods. The results also show that after the early Atlantic (the sediments of which already contained low amounts of pollen), (1) pollen are absent in some sediments and (2) a large hiatus in sedimentation took place. This hiatus comprises a large part of the Atlantic and the complete Subboreal period. Sedimentation is present during the Subatlantic period (late Holocene).

This large hiatus could be due to very low sedimentation rates or non-deposition.

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\(^5\) Felder & Bosch 1989.
\(^6\) See also De Moor 2007.
\(^7\) See Appendix 5 for the complete pollen results.
Very low sedimentation rates during the middle Atlantic-Subboreal in the Meuse River valley are known. Moreover, erosion and reworking of older sediments might have happened. Previous research in the valley of the Geul River has shown that a small river like the Geul (comparable to the Jeker) is capable of reworking or eroding much of its sediments in the river valley.\footnote{De Moor 2007.}

Recorded sedimentation (according to the pollen analysis) in the Jeker valley restarted during the Subatlantic. This period coincides with a strong increase in deforestation in South Limburg, which resulted in increased surface runoff and soil erosion. As a consequence, river dynamics increased (mainly increasing peak-discharges due to the increased surface runoff), resulting in erosion and reworking of older sediments (due to the larger stream power of the river) and increased sedimentation rates (increased sediment input from the slopes of the catchment). Unfortunately, these human induced environmental changes in the catchment may have resulted in the disappearance of potential archives of possible earlier environmental changes and the (natural) environment during the Neolithic, Bronze Age and Iron Age.
Archaeological framework

Ivo van Wijk & Lucas Meurkens

4.1 Bandkeramik settlements and finds in the Maastricht area

The Dutch LBK (5250-4950 BC) is mainly associated with settlements in the Graetheide area. This was chiefly the research area of professor Modderman who excavated the settlements of Elsloo, Geleen, Sittard, and Stein from 1950 onwards till the 1970s. These settlements all belong to the Graetheide cluster. Since the 1980s Dutch Bandkeramik research distinguishes between various settlement clusters. Most research focused on the ‘Graetheide cluster’ bordered by the ‘Heeswater cluster’ and ‘Aldenhovener Platte’. Together they belong to the Rhine-Meuse cluster. It was professor Bakels who introduced the clusters as independent social-economic units in contrast to loose geographical concentrated sites: “the cluster is thought to have functioned as a kind of unit”.1 Her focus point was the distribution of Bandkeramik sites in the southern part of the province of Limburg. It showed that most sites clustered at the Graetheide with no other sites in the direct vicinity. The mutual distance between sites was less than 3 km within an area of 6 x 12 km. These sites all have three geographical aspects in common: they are located on loess soils, on the edge of a terrace and within 750 meters of running (fresh) water. In Bakels’ view, the absence of sites outside the Graetheide was due to the lack of one of these preferred geographical aspects, which made the terrain undesirable for habitation. Another study acknowledges the importance of the three geographical aspects for at least the first and oldest settlements but takes into account other variables to explain site location choices.2

Recent research has shed light on the southern extension of the Graetheide settlement group towards Beek and Ulestraten, as well as sites on the central parts of the Graetheide.3 Most sites are situated on the Middle terrace in the vicinity of the water courses of the Meuse River, the Ur and the Geleenbeek. The settlements are characterized by rather large numbers of houses (60-200) clustered in relatively small areas. Research into the settlement structure is ongoing, but has so far been inconclusive as a result of the lack of synthesising research. The postulated life span of individual houses and their wards in these settlements allows for different scenarios regarding the entire Graetheide occupation.

Dutch and Belgian sites along the Heeswater (to the north and west of Maastricht) are separated from the Graetheide group by the Meuse River and an empty zone of several kilometres. The Heeswater group borders on the Haspengouw cluster west of Liege at the Upper Geer/Jeker. The Heeswater cluster encompasses mostly Belgian sites, although a few are situated in the Maastricht area.

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1 Bakels 1982.
2 Van Wijk in prep.
3 Van Wijk et al. 2014.
4.1.1 History of research in the Maastricht area

The first record of confirmed LBK finds in the Netherlands dates to 1925 when dr Holwerda of the National Museum of Antiquities in Leiden initiated excavations at Maastricht Caberg (summarily published in the *Berichte der Römisch-Germanischen Kommission* in 1927). In the following years many other such finds appeared, mostly in the Graetheide area during excavations by both amateur archaeologists and professionals. After World War II, Bandkeramik research was boosted by the well-known large-scale excavations in the Graetheide area by Modderman (Elsloo, Sittard and Stein) and Waterbolk (Geleen). These sparked off popular (amateur) interest anew as due to post-war city development programmes many finds and sites emerged. The final decades of the past century saw only amateur activities and excavations on a smaller scale at Maastricht-Belvédère and at Caberg (Maastricht-Klinkers). Interest again increased with the Leiden University rescue excavation at

<table>
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<th>Name</th>
<th>Dutch chronology</th>
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<td>Youngest LBK</td>
<td>2d</td>
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<td>1c</td>
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<tr>
<td>5200-5500</td>
<td>I</td>
<td>Oldest LBK</td>
<td>(1a)</td>
</tr>
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*Figure 4.1*  
Bandkeramik settlements and find spots in the Maastricht area

*Table 4.1*  
Chronology of the LBK in the Euregion.
Geleen-Janskamperveld in 1990-1991, and smaller campaigns at Beek-Geverikerveld and the Sittard settlement. With the advent of Archaeological Heritage Management at the end of the 1990s (Valletta Treaty), the initiative for archaeological research into the LBK became more and more dependent on construction work and was limited by the financial margins of building projects. Nevertheless a number of smaller and larger scale excavations took place which also led to the discovery of new sites, occasionally in rather unexpected locations. Interesting sites include two LBK sites outside the loess area in the Meuse valley (Itteren-Sterkenberg and Stein-Nattenhoven), and sites with special features such as ditches (Beek-Beekerveld and Beek-Kerkeveld). Some medium to large-scale excavations took place, such as at Elsloo-J. Riviusstraat, Beek-Kerkeveld, Stein-Heidekampweg, and Maastricht-Cannerberg. Within the Maastricht area sites like Maastricht-Lanakerveld, Maastricht-Randwijck (three refuse pits) and Maastricht-Klevarie (one refuse pit) have to be mentioned, while amateur archaeologists discovered more sites along the Meuse at Smeermaas-Hocht. Together with the Cannerberg site, these sites show that Bandkeramik habitation around Maastricht has been denser than previously assumed.

Bandkeramik research in Belgium started at the end of the 19th century with investigations made by Marcel De Puydt of the Liège Archaeological Institute near flint knapping areas at Rullen⁴ and the excavations of so-called Bandkeramik ‘fonds de cabanes’ or pit dwellings in the Haspengouw area near Liege.⁵ The finds were grouped as Omalien by Rutot⁶ after the site Omal in the western part of the Haspengouw. In the next decennia more sites were discovered as a result of efforts made by J. Hamal-Nandrin, J. Servais (both of Liege University) and A. Baron de Loë (Royal Museums of Art and History, Brussels). The first Bandkeramik site in Flanders was only discovered in 1952 at Rosmeer when H. Roosens documented the remains of a Bandkeramik settlement at the Staberg during the excavation of a Roman villa. It initiated a range of field surveys to prospect the region around Rosmeer for Bandkeramik habitation. Especially the work of G.V. Lux and N. Peuskens yielded over 20 new sites in the municipalities of Bilzen and Riemst.⁷

With the increasing number of sites it became clear that different settlement clusters existed. Lodewijckx identified a cluster at the area around the Kleine Gete⁸ located outside the known Bandkeramik distribution area. Another cluster was identified in the Henegouwen area at boven Dender.⁹ Recent research is mostly carried out by Liege University and primarily focuses on sites from Wallonia.

Over the past decades the classical material culture and settlement studies remained important. However, accents have shifted and now also include intra-site spatial analysis and ‘exotic’ (i.e. non-LBK) pottery types such as Limburg and La Hoguette. We hope that in the future the apparently sudden demise of the LBK in these parts may be included. In comparison to the large-scale projects that have been conducted in France and Germany recently, the post-1970 Limburg research is rather limited. The preservation of prehistoric remains in the area is hampered by the decalcification of the loess soil, while it is also the dispersed and sometimes preliminary nature of the data that hinders a more important contribution to present day research topics about settlement dynamics and provenance of initial colonisers.

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⁴ De Puydt 1896.
⁵ Vanmontfort 2011.
⁶ Rutot 1907.
⁷ Lux 1964.
⁹ Constantin et al. 1979.
4.1.2 The Heeswater cluster

The settlements on and around the Caberg, an area north of Maastricht that harbours most Bandkeramik sites in the area, are part of a larger group of LBK settlements along the Heeswater brook. With its sources further west in Belgium, this stream runs along the northern slope of the Caberg and drains into the Meuse River. The settlements along the Heeswater were originally grouped as the Heeswater cluster.\(^{10}\)

In a recent overview of Belgian LBK sites, however, there is no mention of the Heeswater cluster but a distinction is made between the Hesbaye/Haspengouw (NE Belgium) and Hainault/Henegouwen (SW Belgium) groups.\(^{11}\) Apart from some isolated sites in the hills around Liege the presented distribution map\(^ {12}\) reveals three different groups (or clusters) of settlements in Belgium: one along the two rivulets Boven-Geer and Yerne, another group along the Beneden-Geer, and finally a cluster of 15 settlements (including Rosmeer and Vlijtingen) in the Dry-Haspengouw, just south-west of Maastricht. The three groups are divided by ca. 8 km wide stretches where no LBK habitation has been found yet. The Graetheide and Heeswater cluster are situated about 8 km apart from each other. More to the east the distance to the cluster on the Aldenhovener Platte is larger and measures about 25-30 km.

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\(^{10}\) Bakels 1982; 1987.

\(^{11}\) Jadin \textit{et al.} 2003.

The sites in the Dry Haspengouw are located c. 5 kms southwest of the Caberg settlements, between the sites at Maastricht-Lanakerveld\textsuperscript{13}, Lanaken-Briegdendok\textsuperscript{14}, Maastricht-Dousberg\textsuperscript{15} and Maastricht-Cannerberg. It is plausible to categorise these sites within the Heeswater cluster as Bakels did in 1982. But a word of caution should be made as, like the Graetheide cluster, the Heeswater cluster is exclusively defined on the basis of geographical nearness and relative geographical isolation towards other sites and not by differences in material culture between groups. The Odyssey project\textsuperscript{16} compared sites from the Graetheide and Heeswater and made clear that there is some, but not significant, difference between sites when regarding flint procurement strategies.

Van Wijk & Meurkens proposed that the Caberg settlements might belong to a group of their own. The settlements at the Caberg were founded in the same period as the Graetheide settlements, in contradiction to many other Heeswater sites which are dated younger.\textsuperscript{17}

Apart from the question of what it is that defines a settlement cluster and what type of social entity is at the root of such a group, it is not clear to what extent the Caberg sites may be grouped into one cluster with those along the Heeswater further west, or whether they should be interpreted as two separate and independent groups. With sites like Riemst-Toekomststraat and Lanaken-Briegdendok, which also date to Modderman’s oldest LBK phase, the argument that the Caberg settlements are older seems to be far-fetched. However, the thought remains whether these sites belong to a different settlement group in which they stand in close relation to each other.

The Dutch sites of the Heeswater cluster include the Caberg and Cannerberg sites, as well as evidence for LBK occupation at Randwijck and very likely also on the Dousberg, west of Maastricht. The Caberg sites are known from the excavations carried out by the Dutch National Museum of Antiquities and later excavations by Leiden University at Maastricht-Klinkers, about a kilometre further north. The epicentre of this settlement group appears to be situated in the De Waal area and mainly dates late in the LBK (2c/2d), which coincides with the dates from most Belgian sites to the West and South. Interestingly, the internal structure of some sites in this group (e.g. Maastricht-Klinkers) appears to be less dense than in the Graetheide settlement area. Also in the Maastricht area is an older site, discovered in the 1990s, probably of Flomborn age (phase 1b) (Maastricht-St. Christoffelplein). Research at the Lanakerveld indicated the presence of at least nine sites, as well as a cemetery. Nearby Belgian sites slightly to the west, such as Lanaken-Briegdendok, Rosmeer-Staberg, Vlijtingen-Kayberg and Eben Emael-Int’l les Deux Voyes, may belong to the same settlement cluster. Most Belgian LBK sites are unfortunately defined on surface finds only. Fortunately, there are sites which have been, partly, excavated.

One of the most informative Belgium sites is the one located at Liege-Place st. Lambert.\textsuperscript{18} This settlement is situated on the banks of the Légia rivulet. The site is covered with alluvial clay which preserved organic remains. Although no house structures were found due to Roman and medieval disturbances, it is thought that an

\textsuperscript{13} Meurkens & Van Wijk 2009.
\textsuperscript{14} Lauwers 1985.
\textsuperscript{15} Ploegaert 2007.
\textsuperscript{16} Van Wijk et al. 2014.
\textsuperscript{17} Van Wijk & Meurkens 2008.
\textsuperscript{18} Otte 1984.
LBK settlement has been present. The settlement seems to be occupied at least at the end of the LBK (Modderman phases 1d-2d) although there is still debate about the chronology of the site.\textsuperscript{19} Mostly pits were excavated which yielded a lot of material, including Limburger pottery, flint, stone, burned seeds as well as a great variety of animal bones and bone tools. This showed that apart from cereal cultivation the community also relied (especially in the winter) on hunting and fishing.\textsuperscript{20}

Research at the site of Lanaken-Brieg dendok during expansions made for the Albert canal revealed the remains of two house structures, as well as eight pits.\textsuperscript{21} The pottery assemblage was recently studied and dated the site to Modderman’s ceramic phases 1c.\textsuperscript{22} At Eben Em ael-\textsuperscript{23} Int’l\textsuperscript{2} les Deux V oyes\textsuperscript{23} two house structures with accompanying pits were also excavated. Surveys in the vicinity showed that more sites may be expected. In 2009 at the Toekomststraat in Riemst another two house structures were investigated. One house is preliminarily dated to ceramic phase 1b/1c which shows that sites further away from the Caberg also dated to the Older period.\textsuperscript{24} During the digging of trenches for a gas pipeline in Herderen some isolated LBK pits were discovered.\textsuperscript{25} More extensive research took place in Vlijtingen and Rosmeer. At Vlijtingen-Kayberg, a small section of a Bandkeramik settlement was researched. A total of six house structures as well as over 50 pits were excavated. The pottery dates the site to the Younger period.\textsuperscript{26} The settlement at Rosmeer-Staberg has been intensively excavated. Almost one and half hectare of the settlement yielded the remains of about 14 house structures. The site is dated to Modderman’s ceramic phase 1d-2c.\textsuperscript{27} Noteworthy is that the researchers concluded that the pottery resembled Dutch LBK pottery but that most sherds were tempered with quartz which in turn seems different from the Dutch pottery. The flint assemblage and especially the choice of raw material resembled the Dutch LBK assemblage and the typical Haspengouw or light-grey flint was only present in small quantities.\textsuperscript{28}

High hopes are raised for the Lanakerveld LBK-cemetery\textsuperscript{29} which is the second in the Netherlands after the Elsloo graveyard, not counting the three graves at Geleen-Haessel derveld West. In Belgium two examples are known from presumably isolated burials at Holloigne-au-Pierres\textsuperscript{30} and a suspected burial at Millen\textsuperscript{31}. In the future comparisons of sites from both settlement groups may further specify differences and similarities, some of which will be mentioned below. Chronologically the Heeswater sites appear to be settled during the Younger Period, although the Lanakerveld and Oud-Caberg sites are dated earlier (mainly phase 1 c/d). In addition, there may be important differences in the structure of the settlements. Both the pottery and lithic material from the Heeswater group appear to be quite comparable to those from the Graetheide area. However, future research may point to regional

\textsuperscript{19} The ceramic dates differ considerably from the radiocarbon dates that have been analysed (Lanting & Van der Plicht 1999/2000, 42-46). They (Lanting & Van der Plicht, but also Amkreutz 2004, 69-70) prefer the ceramic dating as the radiocarbon dates provides too many insecurities.
\textsuperscript{20} Otte 1984, Amkreutz 2004.
\textsuperscript{21} Lauwers 1985.
\textsuperscript{22} Personal comment P. van de Velde.
\textsuperscript{23} Close et al. 1997.
\textsuperscript{24} Vynckier et al. 2009.
\textsuperscript{25} Vanmontfort et al. 1999; 2002.
\textsuperscript{26} Marichal et al.1987.
\textsuperscript{27} Janssens 1974.
\textsuperscript{28} Ulrix-Closset & Rouselle 1982.
\textsuperscript{29} Meurkens & Van Wijk 2009.
\textsuperscript{30} Thisse-Derouette & Thiess 1952.
\textsuperscript{31} Lodewijckx et al. 1989.
variability, especially in the later phases of their existence. The Meuse River and the relatively empty zone (some 8-10 km wide) between the two groups of settlements may or may not be indicative of the existence of two separate socio-political entities.

In the Heeswater area a number of LBK sites have already been (partially) excavated and investigated. Especially the Caberg sites provide a profound insight into the structure of the settlements. Further upstream along the Heeswater we have only a few excavated sites. They do not provide a solid base to define the similarities and differences in material and social culture within this cluster. Geographically they all seem to belong to one settlement cluster. As a start the Caberg settlements provide more information about the LBK west of the Meuse River but without further research at the Belgian sites, the question remains whether all settlements belong to the same cluster.

A number of differences between the Caberg and Heeswater sites on the one hand, and those on the Graetheide on the other can already be mentioned. The well-known Graetheide settlements (Elsloo, Sittard, Stein and Geleen) are characterized by a higher feature density, indicative of repeated rebuilding within a delimited area. It may be hypothesized that consecutive houses were built and rebuilt within the same house site or yard\(^\text{32}\). As they were in the Aldenhover Platte area.\(^\text{33}\) In contrast, both the Caberg and Heeswater settlements are characterized by more or less isolated house sites suggesting that settlements over time expanded or ‘moved’.

There is also a chronological difference. As far as presently known, the sites upstream the Heeswater perhaps all date to the younger phases of the LBK, in contrast to those in the Graetheide area where occupation started during phase LBK-1b. At Caberg, occupation started synchronically with the Graetheide in phase 1b (suggesting simultaneous colonisation) and continued into LBK phase 2c. This may suggest that the Belgian LBK sites along the Heeswater are offsprings of the Caberg group; however, ‘following (chronologically)’ does not mean ‘following from (causally)’.

The numerous resemblances/similarities in the ceramic repertories of the two geographic areas suggest marital connections between their inhabitants, and argue strongly against incisive social separation.

The Odyssey research\(^\text{34}\) demonstrated that, at least for the Younger LBK period, the raw material component displayed a remarkable diversity for the investigated sites, both in the Graetheide and Caberg area. The composition differs per settlement, per generation and even per house site. Both areas for instance yielded lithic assemblages with relatively a lot of Valkenburg, Rullen, or Hesbaye-type flint (in varying combinations), next to features with mainly a Rijkholt (Lanaye) component. On the Caberg, rolled terrace flint was regularly used and no distinct preference for ‘fresh’ flint from primary locations or originating in the slopes could be documented. Despite this diverse image it should be mentioned that during all phases of occupation in both areas flint was regularly used from the extraction points near Banholt. These outcrops are situated about 25-30 km from the Graetheide area and, on the other side of the Meuse River, about 10-15 km from the Caberg.

\(^{33}\) For example Luning & Stehli 1989.
\(^{34}\) Van Wijk et al. 2014.
Of course the question remains whether what we encounter on the Caberg sites is valid and important, as Banholt-type flint was also actually derived from this extraction point east of the Meuse River. It is possible that locally, within deposits of the Heijenrath Formation west of the Meuse River, similar conditions existed, leading to similar characteristics of degradation as in Banholt. To date, however, no extraction points with these characteristics have been documented. Of more importance than the exact origin of the flint appears to be the notion that both Caberg and Graetheide occupants shared an interest in similar characteristics when working Rijckholt-type flint. The flint present in the direct surroundings of the sites was not of sufficient quality and time and energy was invested to obtain the traditional Banholt variant, either by crossing the Meuse River, or by searching for an identical twin source west of this river. The diversity in flint sources is not reflected in the sources used for stone artefact manufacture. Most stones are obtained from local sources. Exotic sources can be distinguished for adzes, ochre and some of the grinding stones.

Because the number of settlements that have been investigated on the southern edge of the Graetheide area has increased in recent decades, it now appears that the LBK occupation there gradually linked up with that across the Meuse River on the Caberg. However, with time this river may potentially have come to act as a dividing line. For now there is still discussion as to what extent the LBK settlement complex on the Caberg may be interpreted as an independent cluster, or should rather be linked with one of the adjacent groups. Apart from the question of the relations between the Caberg and Graetheide LBK people, it may be hypothesized that the settlement on the Caberg was the starting point of the later colonisation of the Haspengouw or Hesbaye area to the west and south, similar to the manner in which the Graetheide and the river terraces to its south were colonised from their pioneer settlements.

In conclusion it can be stated that, as Bakels proposed, there was indeed a division between the Graetheide cluster and the Heeswater cluster; however, this division was initially driven only by geographical factors. Several differences, listed above, are present in regard to settlement structure, material culture and procurement strategies. Whether these differences also include different social interactions remains an interesting object of study.

4.1.3 The Bandkeramik site of Maastricht-Cannerberg

The archaeological importance of the Cannerberg has been long known. In 1984 a site report was presented to the National service of Antiquities which described the existence of two Bandkeramik settlements on the Cannerberg, dating to the end of the LBK (LBK-phase 2d). From 1982 onwards local archaeologist H. Philippen made several observations on the site (Figure 4.3). In total, 6 different find spots were prospected. One of the observations was that some spots yielded vast amounts of flint, ranging from all aspects of the ‘chaine d’opératoire’. The most southern find spot also yielded two adzes of lydite; in total four adzes were found. In the then freshly ploughed-up dark soil, an indication of LBK features present, pottery sherds were collected (Figure 4.4).

37 Bakels 1987, 63.
Several amateur and professional archaeologists have visited the site since then and reported numerous lithic finds. The site has always been known as one of the rare examples of settlements\textsuperscript{38} that are situated on the high terrace of the Meuse. Other known sites are located east of Beek.

4.2 Late Bronze Age and Iron Ages sites in the Maastricht area

Although the Cannerberg is known for its Bandkeramik settlement, other habitation periods were to be expected. The seemingly undeniable, but non-chronological, relationship between LBK, Iron Age and Roman settlements, as far as site location concerns, seemed to be existent at the Cannerberg as well. A number of Iron Age sites is known from the Maastricht area, both situated on the loess covered plateaus and the Meuse valley.

However, there is still a lot of work to be done in understanding settlement structure and existence in the late Bronze Age and early Iron Age. Most striking is the relative absence of settlements and especially larger house structures. Cemeteries are more abundant. The scientific yield for the region is primarily formed by excavations at Sittard-Hoogveld\textsuperscript{39}, Sittard-Hof van Limburg\textsuperscript{40}, Beek-Maastricht Aachen airport\textsuperscript{41}, Maastricht-Amby, Maastricht-Randwijck\textsuperscript{42} and Maastricht-Landgoederenzone\textsuperscript{43}.

Within the Maastricht area few settlements are known but clear house structures seem to be missing. Isolated postholes, pits and find concentrations dominate the picture, with sites like Borgharen and Itteren.\textsuperscript{44} These sites from the Meuse valley, however, all seem to date in the late Bronze Age.\textsuperscript{45} Near Maastricht-Oosterveld remnants have been found that cover the whole time span of the Iron Age, including presumed

\textsuperscript{38} De Grooth 2007.
\textsuperscript{39} Tol & Schubbink 2004.
\textsuperscript{40} Van Hoof \textit{et al.} 2013.
\textsuperscript{41} Tichelman 2010.
\textsuperscript{42} Dijkman, 1989; Knippels, 1991.
\textsuperscript{43} Hazen & Blom 2015.
\textsuperscript{44} Porreij-Lyklema & Van Wijk 2014.
\textsuperscript{45} Meurkens in prep.
Figure 4.4
Overview of pottery finds from H. Philippen.
Worth mentioning is a middle and late Iron Age cemetery found in the direct vicinity of the Maastricht-Oosterveld settlement. Settlements are also known from the loess-covered terraces. A large excavation at Maastricht-Landgoederenzone showed the remains of some late Bronze Age – middle Iron Age yards. One larger house structure has been identified as well as 16 granaries. Together they belong to a larger settlement located east of the research area. At the quarries at the Caberg, remnants of Iron Age settlements were excavated as well. They consist merely of clusters of pits and no structures could be identified. A spectacular find is the presence of a clay mask at Maastricht-Klinkers. At Lanakerveld some settlement clusters have been identified as well as an urnfield. Located just to the north a late Bronze Age settlement was situated at Lanaken-Europark. The settlement consists of 17 small structures and dozens of pits.

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**Dutch sites**
1. Sittard-Hof van Limburg
2. Geleen-Janskamperveld
3. Itten
4. Borgharen
5. Maastricht-Randwijk
6. Maastricht-Belvédère
7. Maastricht-Klinkers
8. Maastricht-Cannerberg
9. Maastricht-Douwberg
10. Maastricht-Oosterwijk
11. Maastricht-Vroendael
12. Maastricht-Lanakerveld
13. Maastricht-Withuisveld
14. Sittard-Hoogveld
15. Arensvenhout
16. Beek-Maastricht-Aachen airport
17. Eijsden-Poelveld
18. Maastricht-Landgoederenzone
19. Maastricht-Amby
20. Vouwmaes
21. Neerharen-Rekem
22. Lanaken-Europark
23. Riemst-Spelver
24. Rosmeer-Geel
25. Vlijtingen-Kayberg

**Belgian sites**
21 Neerharen-Rekem
22 Lanaken-Europark
23 Riemst-Spelver
24 Rosmeer-Geel
25 Vlijtingen-Kayberg

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**Figure 4.5**
Iron Age settlements and cemeteries in the Maastricht area

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47 Dijkman 1995.
49 Verhart 2006, 119.
50 Meurkens & Van Wijk 2009.
In 2007, at Maastricht-Dousberg some isolated postholes and a pottery filled pit were found.\textsuperscript{52} East of the Meuse, at Maastricht-Heukelstraat, where some granaries and grain silos were excavated, Hendrix and Torremans made some small-scale observations\textsuperscript{53}. The grain silos, dating to the middle Iron Age, were pear shaped and had burnt edges. At Gronsveld-Duysterstraat loam extraction pits were found as well as a large pit with a large quantity of pottery.\textsuperscript{54}

The largest urnfields in the region are located at Maastricht-Amby (150 graves)\textsuperscript{55} and at the cemetery near Neerharen-Rekem (250 graves)\textsuperscript{56}, which also includes a nearby early and middle Iron Age settlement. The Amby cemetery is particularly rich regarding grave goods. Over 40\% of the graves yielded grave goods, like pots, flint or stone artefacts, bronze objects, amber beads and animal bones. More traces of urnfields are known from Maastricht-Withuisveld\textsuperscript{57}, Vroendaell\textsuperscript{58}, Oosderveld\textsuperscript{59} and Eijsden-
Poelveld. All are relatively small urnfields dating to the late Bronze Age and early Iron Age. Some of the graves have a rich content with various bronze objects like weaponry and jewellery. Other Belgium Iron Age sites have been excavated at Vlijtingen-Kayberg, Rosmeer-Staberg and Rosmeer-Diepenstraat. At Rosmeer-Diepenstraat an early-middle Iron Age house structure was excavated, which resembles a structure excavated in Sint-Oedenrode, as well as a few dozen pits. The settlement at Vlijtingen dates to the early Iron Age and the site of Rosmeer dates to the middle Iron Age. Somewhat closer to the Cannerberg site is the recently excavated early and middle Iron Age settlement at Spelver. This settlement contained the remains of 19 house structures, 17 granaries, two cremation graves and many pits. The houses resemble incidental houses found at Sittard-Hoogveld, Beek-Maastricht Aachen airport and Maastricht-Landgoederenzone but also house types associated with settlements on the sandy soils. It fuels the belief that not only small buildings were present in the loess zone during the early Iron Age. Still, house structures in the Maastricht area are almost absent.

Late Iron Age sites are scarce in the region. The site of Beek-Maastricht Aachen airport yielded a number of house structures, two small clusters of cremation graves and two circular ditches. Traces of a late Iron Age ditch system and a cremation grave were found at Maastricht-Landgoederenzone. This ditch system resembles ditch systems found in the Meuse valley at Itteren. At Itteren-Emmaus two cemeteries dated to the middle and late Iron Age were excavated. Here, two ditch systems existed in combination with the cremation graves. At Voulwames, just north of Itteren-Emmaus, a similar urnfield was excavated. Meaningful is the abundance of children and young adults in this cemetery. Some pits and ditches were found east of the Meuse at Arensghenhout, possibly belonging to a settlement. A similar site is known from Eckelrade which also yielded some pits and post rows as well as the corner of a V-shaped ditch system. A square or rectangular ditch system was found at Gronsveld in combination with four cremation graves. For the region there seems to be a striking relationship between middle/late Iron Age square or rectangular ditch systems and cemeteries containing cremation graves.

In terms of material culture Hiddink & De Boer gathered a lot of information during the excavation of a rivulet valley near Neerbeek. In the fluvial deposits they found large amounts of settlement refuse containing large quantities of pottery, stone, flint, slag, La Tène bracelets and other metal objects (i.e. 4 fibulae and a shovel). The richest find is from Maastricht-Amby where a Celtic coin hoard was uncovered. It contained 41 golden en 78 silver coins.
Although typical late Iron Age fortified spaces seem to be absent in the Netherlands, one is known near Maastricht from the oppidum of Kanne-Caster in Belgium. It is situated on the southern edge of the Pietersberg, close to the Cannerberg and was possibly constructed in the first millennium BC.\textsuperscript{74}

We are more informed about cemeteries and ritual places in the Iron Age than about settlements in the Maastricht area. Information about settlements remains relatively scarce but recent excavations yielded a lot of knowledge. Still, it proves to be difficult to generate models regarding site distribution and settlement patterning. One of the problems is that due to the lack of large-scale excavations uniform patterns in most sites seem to be absent and diversity, especially considering house structures, is large.

Within the Cannerberg research area some fragmented Iron Age pottery and a La Tène glass bracelet were known prior to the excavation.\textsuperscript{75}

\textsuperscript{74} Roosens 1975;1976; Verhoeven 2008.

\textsuperscript{75} Personal comment M. Duurland who prospected the Cannerberg at several occasions.
4.3 The Roman Period

Maastricht played an important role during the Roman Period, being one of the larger cities between Tongeren and Heerlen. The Roman settlement was founded in the first century AD near a bridge head. A wooden bridge that formed the Meuse crossing has partly been excavated. The city’s strategic importance was emphasised by a stone fortification from the fourth millennium AD that was built near the bridge. Due to extensive excavations much data is available about the development of the city. Less is known about the rural habitation surrounding the city. It appears that in the vicinity many Roman villas were present, but unfortunately until now none have been excavated properly. Most villa sites remain obscured by surface finds of roof tiles and other typical Roman find material. Evident villas are known from Maastricht-Louwberg/Cannerberg, Borgharen and Meerssen-Herkenberg. Recently, villas at Maastricht-Lanakerveld and Maastricht-Landgoederenzone have been discovered.

At Lanakerveld the outer segments of a villa area, particularly some rectangular ditches, a pont and a road were found. Rectangular ditches were also present at Landgoederenzone, as well as water pits, two clusters with Roman graves and a road. From Smeermaas, west of the Meuse, another villa is known. This villa was constructed merely with wooden structures. Heating systems and a stone cellar were also present. Nearby a cemetery was situated. The outlines of an early Roman settlement were revealed at Neerharen–Rekem. The settlement eventually evolved into a villa rustica. Although the idea of a stone built villa landscape persists, there is enough evidence of indigenous settlements with a rectangular ditch and wooden structures like the site at Veldwezelt.

Within the Cannerberg research area some Roman find spots are known. Just north of the excavation area lies the villa site of Maastricht-Louwberg where an early Roman gem was found; this site yielded no other finds. From the other side of the Jeker valley, close to the Pietersberg, a surface find site with vast numbers of roof tiles is known.

4.4 Late Medieval and Modern times

The current open landscape has its roots in late medieval times when large parts of the landscape were cultivated. Many present day arable lands are littered with 14th and 15th century waste that mark the start of large scale cultivation in the area. Late medieval land division is, although obscured by modern build up, still somewhat visible as it is orientated on existent constructed roads such as the Cannerweg.

As a strategically situated city, Maastricht has a reputation as a city under siege since the first Viking raids in 881 AD. One of the best known sieges is the Siege of Maastricht in 1747, also known as the Battle of Lauffeld or Lawfeld or Lauffield. Here the war of the Austrian succession was fought with on one side, again (sic), the French (Louis XV), accompanied by Spain, Prussia and Bavaria, and on the other side the defenders:
Austria, Russia, England and the Dutch republic. The main battle took place just southwest of Maastricht near Bilzen in Belgium. The outcome was disastrous for the defenders with over ten thousand casualties and eventually the capture of Maastricht in 1748.

But as mentioned, the city has been under many sieges from the 13th century onwards. Apart from the various historical monuments, including fortifications, there are also archaeological remains that date to this period. From sites at Caberg85, Lanakerveld86 and Lanaken-Europark87 remains of fortification ditches or war cemeteries are known. In some cases horses were buried, as is witnessed near Borgharen where the remains of 65 horses were found in a large cemetery. This mass grave dates to 1794 and is related to the Siege of Maastricht. One of the battles in the surrounding area of Maastricht, took place at the Louwberg, close to the research area.

No late medieval remains are archaeologically known from the research area. Just east of the research area, on the flanks of the Cannerberg, Chateau Neercanne is located. This 17th century castle with its 14th century predecessor (castle of Agimont) is constructed mainly of limestone. The limestone was quarried from shafts going in the Cannerberg. Nowadays these shafts function as wine cellars. But most shafts under the Cannerberg were not dug out on behalf of limestone quarrying but as part of a large underground military base built in 1955. This 6.8 ha, 50 m deep ultra secret NATO complex with 8 km of tunnels (including a three-hole golf course with artificial grass) was erected on German built concrete floors from World War II. Today its air vents are still visible within the research area (Figure 4.8).

85 Van Wijk et al. 2014.
### Figure 4.9
Chronological timetable.

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<th>Archaeological Era</th>
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- **Paleolithic**
- **Middle**
- **Old**

*Note: The table shows a chronological timetable with specific dates for different geological and archaeological periods.*
5 Landscape and soils at the research location

Jos de Moor

5.1 Introduction

The landscape in which the research location is situated is characterized by the presence of a rather flat plateau (called Cannerberg, also known as Louwberg) with a steep slope and the valley of the Jeker River to the east and a more gently sloping area on the west. The plateau is part of a river terrace formed by the Meuse River during the Middle Pleistocene (Sint Pietersberg terrace). This relatively high elevated terrace forms a kind of “promontory” location between two low lying valleys (Figure 5.1 and Figure 5.2).

The soil map of the area indicates the presence of a “radebrik” soil in the western part of the research area and an unnamed soil on the eastern part that consists of fluvial deposits (gravel and coarse sand) older than the Late Pleistocene. This unnamed soil could indicate that no loess deposits are present in this eastern part of the research area, implying erosion and a limited preservation of the archaeological site.

For a proper overview of the landscape and the soils at the research location, soil profiles were documented in all the trenches during the preliminary test research (Figure 5.3). With the soil profiles, the degree of conservation of the archaeological site could be assessed. During the excavation no additional soil profiles were documented. From the soil profiles, north-south and east-west cross-sections were constructed.

Figure 5.1
The nearly flat surface of the research area. This is the loess covered Maas River terrace.
Figure 5.2
Digital Elevation Model of the research area

Table 5.1
Soil profile layers test trenches and excavation

<table>
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<tr>
<th>Code</th>
<th>Description</th>
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<td>Top soil / recent plough layer (1Ap)</td>
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<td>Colluvium (1C)</td>
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<td>B/Bt horizon (2Bb/Btb)</td>
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<td>S5025</td>
<td>BC horizon (2BCb)</td>
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<td>S5030</td>
<td>C horizon (loess) (2Cb)</td>
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<td>S5040</td>
<td>C horizon (fluvial gravel) 3Cb</td>
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</table>
Figure 5.3
Location of the profile cross-sections during test trenching
Figure 5.4
Reconstructed east-west and north-south soil profiles.
The top soil is a plough layer with a thickness of 30-40 cm, which consists of either a single colluvium or a mix of colluvium and a reworked A horizon of the former radebrik soil. On the highest (northern) part of the research area there is no separate layer of colluvium below the plough layer. Instead a Bt horizon is present directly below the plough layer. Starting in test trench #38 (Figure 5.4), a second layer of colluvium (distinct from the plough layer) is present which increases in thickness towards the south. In trench #20, this second colluvium layer is 10-15 cm thick and more to the south, in trench #5 even 20-30cm. From east to west (trenches # 18, 19, 20, 25 and 26), hardly any variation in the thickness of the colluvium has been observed.

No E(eluviation) horizon was documented; the Bt horizon is relatively thin compared to other locations in South Limburg, where these horizons of up to 60 cm thickness are present. Mainly in the northern part of the site, the top of the B horizon often shows indications of reworking, probably by ploughing. It is also striking that the for the loess area of the Netherlands typical prism-like soil structure of this horizon is missing, together with the contraction cracks and the purple-brown colour. Only in some isolated spots in the southwestern part of the area, these cracks and structures are present (Figure 5.6).

Figure 5.5a/b
Typical soil profiles in the research area (trench #12 and trench #20) with the plough layer, a thin layer of colluvium, a Bt horizon and the C horizon (C-layer only visible in Figure 5.5b).
Below the B(t) horizon the C horizon in the loess is present. This latter horizon is mostly decalcified, although in some trenches (#9, 36) we documented non-decalcified loess too. Below the loess, coarse sand and gravel are present as can easily be observed in the eastern part of the site where hardly any loess is present and the gravel reaches the subsurface (trenches 47, 69, 73 and 75 in Figure 5.7). Coring data from the national database of the Geological Survey (DINO database from TNO) also indicate the varying depths below the surface of this gravel (Figure 5.8). Toward the west, the loess cover increases in thickness.

The soil profiles indicate that the original upper parts (A and E horizons) have been partly truncated (eroded) or reworked (agriculturally), although no major soil erosion has been observed: the B horizon is largely intact. The topsoil consists of colluvium, which is either the plough layer or a combination of the plough layer and a separate layer of colluvium below it.

Figure 5.6
Characteristic cracks in the Bt-horizon (trench # 2).

Figure 5.7
Gravel near the surface at the southeastern part of the area.
In the southeastern part (visible in trench 75) a gully-like structure was observed which is probably of anthropogenic origin. On the sloping (bowl-shaped) southeastern part of the area some erosion has taken place, as illustrated by the absence of the Bt horizon and the presence of a relatively rich layer of colluvium.

5.2 Visibility and conservation of features

The limited amount of erosion has resulted in limited loss of archaeological information at this site. On the other hand, the visibility of LBK traces was often problematic (as compared with other LBK sites in South Limburg), whereas the Iron Age features were much more visible. Within the LBK site itself, differences in visibility between postholes and elongated pits (Langsgruben) were visible. The variety in visibility may be explained as follows:

- The development of the Bt horizon is less distinct than at other loess LBK locations in South Limburg. The loess that has been deposited on the Maas terrace of the Cannerberg is probably older than the loess on the younger Maas terraces. It is very likely that in the older loess on the Cannerberg (due to a slightly different geochemical composition) soil forming processes have occurred such as the internal weathering of clay minerals (constitution of a Bw horizon). This process of “browning” is a well-known cause of the decreased visibility of archaeological features. \(^1\) As with other soil formation processes, “browning” is more intense in the

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\(^{1}\) cf. Huisman 2006.

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**Figure 5.8**

Data from DINO cores near the excavation site and from those in the valley of the Jeker. The indicated values represent the depth below the surface in cm.
upper part of the horizon. This may explain the difference in visibility between the upper and lower infillings of postholes.

- The nature of the material filling of the postholes and pits may vary too. Different types of infillings will react differently to soil formation processes. Some of the infillings may be relatively “clean” because of a short period of use, whereas other pits have been filled with garbage, which is less susceptible to soil formation processes.

- The factor time. The Iron Age features experienced less weathering processes.

To summarize, it is likely that a combination of soil formation/internal weathering and differences in the nature of the material within the features is responsible for the variations in visibility of the LBK traces. It may be stated that specialized soil micromorphological and/or geochemical research provide a better understanding of the processes and nature of the infillings. We therefore recommended that during future excavations in the LBK area in South Limburg (and the adjacent loess areas in Belgium and Germany as well), features with both good and bad visibility are systematically investigated on soil processes and content.

5.3 A pollen sample from the Jeker valley

Marieke Doorenbosch

5.3.1 Methodology

To reconstruct the vegetation in the surroundings of Cannerberg during the habitation phases of the Neolithic period, the late prehistory and the Roman Period, a core was taken in the valley of the eker River called Jekerdal (coordinates: 174844.4/314801.0, 54,74 m + NAP). The sampling was performed with a gouge auger by E.E. van Hees and W.J. Kuijper at the 26th of June, 2013. The main goal was to reconstruct an Atlantic period vegetation. The most suitable location for the core was determined by a prospective coring campaign performed by Archol BV at the 4th and 13th of June (§3.5). The spot with the thickest layer of lime gyttja that presumably was deposited during the Atlantic period was selected for sampling. The core reached a depth of more than 5 m below the ground surface. The top 1.75 m of (Colluvium) was cored using an Edelman gouge, since this part of the colluvium was not selected for analysis. The part between 1.75 and 3.63 m was cored with a wide gouge (diameter = 4 cm), the part between 3.63 and 5.27 m with a small gouge (diameter = 3 cm).

Sixteen subsamples, taken from 2.29 to 3.82 m, were analysed for pollen. Every subsample consisted of 1 cm³ sediment. Two tablets containing Lycopodium spores were added to every subsample. All subsamples were treated with 10% potassium hydroxide (KOH), hydrogen chloride (HCl), acetolysis and bromoform-alcohol (specific gravity = 2.0). The chemical preparations were performed by E.E. van Hees and M. Doorenbosch, the pollen analysis was performed by M. Doorenbosch. Grains were identified with the aid of the keys of Beug.¹ The results are shown in a pollen diagram, see Figure 5.9. Percentages are based on an upland pollen sum, i.e. the total amount of pollen grains from trees, shrubs and herbs growing on dry locations. Ecologically indeterminable pollen types have not been included into the pollen sum. In addition to the pollen analysis a few samples have been analysed for macro remains by W.J. Kuijper. Results are shown in Table 5.2.

¹ Netherlands Coordinate System.
² Beug 2004.
A detailed description of the stratigraphy of the core from the top down is given below:

- 0 – 2.10 m  light brown loam
- 2.10 – 2.21 m  light brown/grey loam
- 2.21 – 2.27 m  grey loam
- 2.27 – 2.36 m  transition to dark grey loam
- 2.36 – 2.51 m  dark grey loam + lime gyttja
- 2.51 – 2.59 m  spotty light brown/grey loam + lime gyttja
- 2.59 – 2.81 m  dark grey loam
- 2.81 – 2.85 m  slightly loamy + lime gyttja
- 2.85 – 3.02 m  spotty yellow/ light grey loamy + lime gyttja
- 3.02 – 3.09 m  light grey loam + lime gyttja
- 3.09 – 3.16 m  transition to dark grey loam
- 3.16 – 3.22 m  dark grey loam + black humus blocks
- 3.22 – 3.26 m  light grey loam + lime gyttja
- 3.26 – 3.33 m  yellow lime gyttja + light grey spots
- 3.33 – 3.37 m  clean yellow/ light grey lime gyttja
- 3.37 – 3.44 m  light grey loam + lime gyttja
- 3.44 – 3.50 m  light grey loam + brown/ black humus blocks
- 3.50 – 3.56 m  black peat
- 3.56 – 3.58 m  dark grey loam + black humus blocks
- 3.58 – 3.77 m  black peat
- 3.78 – 3.88 m  peaty loam with brown spots

No detailed profile description below 3.88 m is available. The following description is based on observations during the coring.

- 3.88 – 4.13 m  loam + peaty clay
- 4.13 – 4.35 m  peaty clay
- 4.35 – 4.60 m  peaty clay/ homogenous clay
- 4.60 – 4.85 m  homogenous clay
- 4.85 – 5.10 m  homogenous clay, slightly silty?
- 5.10 – 5.27 m  homogenous clay, very silty

5.3.2 Results

The pollen diagram can be divided into four main zones and several subzones. These zones are based on the Holocene pollen diagram of the Rhineland\(^4\) and the late and postglacial pollen diagram from the south of the Netherlands\(^5\). In addition the results have been compared to the pollen diagram of a core taken in the Belgian part of the Jekerdal, approximately 5.5 km south of the current coring location.\(^6\)

The results will be described per (sub)zone.

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\(^4\) Meurers-Balke et al. 1999.
\(^6\) Zagwijn & de Jong 1976.
Zone 1, 3.67 – 3.60 m
In this zone peat has been formed in the Jekerdal. This zone is characterized by an upland tree pollen sum of nearly 100%. Given this very high percentage of tree pollen, which is mostly dominated by *Pinus* (pine), the riparian zone of the Jeker River must have been very small. The riparian vegetation consisted mainly of Cyperaceae (sedges). Locally ferns (monolete psilate fern spores), *Sparganium* (bur-reed), *Typha latifolia* (bulrush) and *Salix* (willow) were present. The drier parts were dominated by a dense *Pinus* (pine) forest. In addition to *Pinus*, a small peak of *Betula* (birch) pollen is visible. The combination of these two tree species makes it likely that zone 1 dates to the Preboreal period.

The pollen diagram from the Belgian part of the Jekerdal probably starts earlier and shows the vegetation development of the last part of the Younger Dryas. The higher percentage of herbal pollen indicates that during this period the landscape was probably more open. The Preboreal phase in this diagram is very similar to the current pollen diagram, with high percentages of *Pinus*, declining percentages of *Betula* and a herbal vegetation that mainly consisted of Cyperaceae, Poaceae (grasses) and ferns.

Zone 2a, 3.60 – 3.22 m
Zone 2a shows an increase in the pollen percentage of *Corylus* (hazel). *Quercus* (oak) and *Ulmus* (elm) appear and show an increase in pollen percentage. At the same time the percentage of *Pinus* (pine) declines. This zone is also characterized by the appearance of *Tilia* (lime). This indicates that the share of pine forest declined and was replaced by a mixed deciduous forest. Herbs were hardly present, with exception of some grasses (Poaceae) and sedges (Cyperaceae). The latter were probably present at the (small) riparian zone of the Jeker, together with *Sparganium* (bur-reed) and *Thalictrum* (meadow-rue).

This zone dates to the Boreal period. During this phase the peat formation stopped and the deposition of loam and, in increasing amounts, lime gyttja started. This is shown by the analysis of the macro remains (table 1): in addition to several (fragments of) land snails, a number of species of fresh water snails were present. These fresh water snails lived in stagnant or in slowly flowing water, like marshes, which were probably present in the river valley of the Jeker.

Zone 2b, 3.22 – 3.09 m
This subzone is characterized by a noteworthy increase of the percentage of *Pinus* (pine) pollen. This part of the core consisted of loam with humic spots and it is likely that this part was mixed by water. Older *Pinus* (pine) pollen may have ended up in this part of the core as a consequence of this disturbance.

Zone 2c, 3.09 -3.02 m
Zone 2c is most likely a continuation of zone 2a and is characterized by a further decline of *Pinus* (pine) pollen and a high percentage of *Corylus* (hazel) and *Quercus* (oak) pollen. In addition an increase of *Ulmus* (elm), *Tilia* (lime) and *Alnus* (alder) can be seen. This is characteristic for the second (and last) part of the Boreal period. The forest in the drier areas mainly consisted of mixed deciduous trees, in the wetter parts of the landscape alder gained ground. The herbal vegetation mainly consisted of Cyperaceae (sedges), Poaceae (grasses) and Monoletae Psilatae (ferns).
The Boreal phase in the Belgian pollen diagram is comparable to the current diagram.
Decreasing percentages of Pinus (pine) pollen and increasing percentages of Corylus, Quercus and Ulmus show the transition from a pine forest to a mixed deciduous forest.
The layer of lime gyttja is significantly thicker in the Belgian, upstream part of the Jekerdal (>3 m) than in the northern part (0.5 m).

Zone 3, 3.02 – 2.84 m
Zone 3 probably shows the start of the Atlantic period, characterized by the continuation of the increase of Tilia (lime). The decrease of Ulmus (elm) and Quercus (oak) shows that lime has mostly replaced elm and oak in the deciduous forest. In addition Fagus (beech) appears in this zone. Alnus (alder) remained dominant in the wetter parts of the area. The percentages of herbal pollen are still very low and are dominated by Poaceae (grasses), Cyperaceae (sedges) and Monoletae Psilatae (ferns).

It should be noted that the pollen sum of the top two samples in this zone is low (respectively 56 and 126, while a pollen sum of 300 is the norm). Nevertheless, this zone in the pollen diagram shows a trend that fits well within the known vegetation development in the Atlantic period in the southern part of the Netherlands. It is therefore probably that zone 3 dates to the Atlantic period.

After zone 3 a big hiatus in the pollen diagram is present. A sample from 2.60 - 2.80 m contained no pollen. This hinders the reconstruction of the vegetation development in the following part of the Atlantic period. The same problem occurs in the Belgian pollen diagram. The start of the Atlantic period has been recorded, showing increasing percentages of Alnus pollen and declining percentages of Corylus (hazel) and Ulmus (elm) pollen. The remainder of the vegetation development in the Atlantic period cannot be reconstructed.

Zone 4, 2.55 – 2.30 m
Zone 4 shows a completely different picture than shown in zone 1-3. The percentage of (upland) tree pollen decreases, which indicates that the landscape was opening up. The upland forest mainly consisted of Quercus (oak), Fagus (beech) and Corylus (hazel). Carpinus (hornbeam) has appeared, followed by Castanea (chestnut). The forest in the wetter parts of the landscape was dominated by Alnus (alder).

The increase of the percentages of herbal pollen indicates anthropogenic influence. This is also underlined by the presence of (upland) cultural indicators like Plantago lanceolata (ribwort plantain), Plantago major (broadleaf plantain), Chenopodiaceae (goosefoot family) and cereals like Hordeum (barley) en Secale (rye). The riparian vegetation mainly consisted of Monoletae Psilatae (ferns), Sparganium (bur-reed) en Sphagnum (peat moss). Other dominating herbs belong to the grass family (Poaceae), which could have grown in the riparian zone or in the forest undergrowth. The high percentage of Asteraceae liguliflorae pollen (composite family) in the last spectrum of the diagram should be noted. This high percentage is probably the result of the activity of bees that nest in the soil. These bees build their nests at approximately 20-60 cm depth in the soil. The nests are coated with honey and pollen grains as food source for their larvae. Some bee species seem to prefer pollen grains from Asteraceae liguliflorae and when high percentages from this pollen type are present this should be taken into account.\footnote{Bottema 1975.}
Figure 5.9
Results of the pollen analysis from the samples taken from the core from the Jekerdal. Curves have been displayed normal and 10 x exaggerated.
The relatively high percentage of *Fagus* and the increase of *Carpinus, Castanea* and *Secale* in combination with the increase in percentage of herbal pollen indicate that zone 4 dates to the Subatlantic period. As a consequence, the hiatus between zone 3 and 4 must cover several millennia.

The Belgian pollen diagram does not show the vegetation development after the Atlantic period, since the pollen spectra from the higher parts of the core did not contain pollen grains. The sediment of the top part of the core was composed of mixed loam and colluvium, probably due to water transportation. It is likely that the opening up of the landscape due to the activities of man caused erosion from the valley slopes. It is therefore not possible to make a reliable vegetation reconstruction based on pollen analysis of the upper sediments.

5.3.3 Conclusion

The pollen diagram from the Jekerdal shows the vegetation development from the last part of the Preboreal until the Subatlantic period, with exception of a hiatus that probably covers a large part of the Atlantic and the Subboreal period. In the Preboreal period the small riparian zone of the Jeker River was surrounded by a pine forest with the last remaining of a birch forest. Close to the border of the river mainly sedges and ferns were present.

During the Boreal period the pine forest was gradually replaced by a mixed deciduous forest, consisting of oak, elm and hazel. In the beginning of the Atlantic period this forest was replaced by a lime forest. At the beginning of the Holocene period the surroundings of the Jeker River were probably covered with dense forest with little undergrowth. Only the small riparian zone of the Jeker had a more open character and was mainly covered with sedges, grasses, ferns and some marsh vegetation. There is no evidence of anthropogenic influence in this period. The pollen diagram of the Belgian part of the Jekerdal shows a comparable vegetation development.\(^8\)

The vegetation development in the Atlantic and Subboreal period, covering the Neolithic period and the later prehistory, could not be reconstructed, since the sediments that were deposited in these periods did not hold a sufficient amount of pollen grains. The sediments dating to the Subatlantic did contain abundant pollen grains. The analysis of these sediments shows the opening up of the landscape during the Subatlantic period due to increasing human activities. In the beginning of this zone in the pollen diagram the percentage of (upland) herbal pollen is still low, indicating that the forest clearance had only recently started. However, this cannot be said with complete certainty due to the hiatus of several millennia.

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\(^8\) Zagwijn & de Jong 1976.
<table>
<thead>
<tr>
<th>Samplenr.</th>
<th>Seeds</th>
<th>Snails (fresh water)</th>
<th>Snails (land)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (2.29 m)</td>
<td>Some small plant remains (roots)</td>
<td>Vallonia pulchella (1)</td>
<td></td>
</tr>
<tr>
<td>2 (2.39 m)</td>
<td>Some small plant remains (roots) Some sand particles</td>
<td>Juncus 1</td>
<td></td>
</tr>
<tr>
<td>3 (2.54 m)</td>
<td>Some small plant remains (roots) Some sand particles Some ostracods</td>
<td>Oxyloba sp. (1) Sphaerium corneum (some fragments)</td>
<td></td>
</tr>
<tr>
<td>4 (2.69 m)</td>
<td>Some small plant remains (roots) Juncus 2</td>
<td>Trichia hispida (1) Vallonia pulchella (1)</td>
<td></td>
</tr>
<tr>
<td>5 (2.85 m)</td>
<td>Not analysed</td>
<td>Pisidium sp. (1 fragm.)</td>
<td></td>
</tr>
<tr>
<td>6 (2.89 m)</td>
<td>Some small plant remains (roots) Few fragments of chalk chunks</td>
<td>Pisidium sp. (1 fragm.) Valvata cristata (1)</td>
<td></td>
</tr>
<tr>
<td>7 (2.99 m)</td>
<td>A trace of small plant remains (roots) Few fragments of chalk chunks Some ostracods</td>
<td>Eupatorium cannabinum (1 fragm.) Valvata cristata (1)</td>
<td></td>
</tr>
<tr>
<td>8 (3.05 m)</td>
<td>Some small plant remains (roots) Few fragments of chalk chunks</td>
<td>Valvata cristata (3) Pisidium sp. (2 fragm.) Galba trunculata (1)</td>
<td></td>
</tr>
<tr>
<td>9 (3.11 m)</td>
<td>Few small plant remains (roots)</td>
<td>Valvata cristata (3) Bithynia tentaculata (2) Planorbis planorbis (1 fragm.) Bithynia tentaculata (1 operculum)</td>
<td></td>
</tr>
<tr>
<td>10 (3.19 m)</td>
<td>A trace of small plant remains (roots) Few fragments of chalk chunks Some ostracods</td>
<td>Eupatorium cannabinum (1 fragm.) Valvata cristata (3) Bithynia tentaculata (2) Planorbis planorbis (1 fragm.) Bithynia tentaculata (1 operculum) Carychiium minimum (1) Limacidae (1)</td>
<td></td>
</tr>
<tr>
<td>11 (3.29 m)</td>
<td>A trace of small plant remains (roots) Few fragments of chalk chunks Ostracod</td>
<td>Valvata cristata (2) Stagnolia palustris (1 fragm.) Galba trunculata (1) Carychiium minimum (3) Vallonia pulchella (1) Vertigo moulinsi-ana (1 fragm.)</td>
<td></td>
</tr>
<tr>
<td>12 (3.39 m)</td>
<td>A trace of small plant remains (roots) Few fragments of chalk chunks Some ostracods</td>
<td>Bithynia tentaculata (1 operculum)</td>
<td></td>
</tr>
<tr>
<td>13 (3.52 m)</td>
<td>Some small plant remains (roots partly charred?)</td>
<td>Stagnolia palustris (1 fragm.) Valvata cristata (1) Bithynia tentaculata (1) Carychiium minimum (1) Limacidae (1)</td>
<td></td>
</tr>
<tr>
<td>14 (3.60 m)</td>
<td>Few small plant remains (partly charred?)</td>
<td>Galba trunculata (1) Carychiium minimum (3) Vallonia pulchella (1) Vertigo moulinsi-ana (1 fragm.)</td>
<td></td>
</tr>
<tr>
<td>15 (3.66 m)</td>
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<td>Valvata cristata (3) Pisidium sp. (2 fragm.) Galba trunculata (1)</td>
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</tr>
<tr>
<td>16 (3.81 m)</td>
<td>Not analysed</td>
<td>Valvata cristata (3) Pisidium sp. (2 fragm.) Galba trunculata (1)</td>
<td></td>
</tr>
</tbody>
</table>

5.4.1 Introduction

The Jeker River, a tributary of the Meuse River, crosses the border of the Netherlands about 35 km from its source near Lens-Saint-Servais in Belgium. In the Netherlands the Jeker flows only a few kilometers before its confluence with the Meuse in Maastricht. The river has cut through a number of geological formations and formed a small valley situated next to the site Cannerberg. Earlier studies on prehistoric flint finds from the region near the Jeker valley concluded that there are two possible sources of flint in the area. Flint could have been collected from outcrops or colluvial sediments. Alternatively flint is found in a more alluvial context. As the flint analysis of the Cannerberg excavation suggests that the flint has not been subjected to alluvial or eluvial processes, most of the flint found is considered to be “bergfrisch” flint collected from outcrops, or found downhill of such outcrops.
This paragraph will focus on the location of these outcrops with the use of digital elevation models and data from the Geological Survey of the Netherlands. Goal of this study is to determine whether the Neolithic people could easily find flint nodules in the region near the site Cannerberg.

5.4.2 The Limestone of Lanaye

A well documented source of flint in the Jeker area is the limestone of Lanaye which is the top layer of the Gulpen formation. The sediments are part of the Upper-Cretaceous Chalks that were formed in a marine environment. The flint carrying limestone layer of Lanaye, with a thickness of 15-18 m, contains 23 recognizable layers of flint nodules. The flint nodules may have a size of 10 – 100 cm and amount up to 20% in volume. Geographically, the formation of Gulpen is present in the western part of southern Limburg, southeast of the city of Maastricht. South of the line Eijsden-Gulpen-Vaals the limestone layer of Lanaye is eroded.

5.4.3 Data

Many datasets are built by governmental agencies and are therefore limited by the boundaries of a country. The Jeker River crosses the border of two countries. When showing the maps of the research area one would preferably combine maps from Belgium with maps from the Netherlands. Combining GIS-datasets can be a complicated, costly procedure. For this analysis only Dutch datasets are used.

The Geological Survey of the Netherlands provides a huge database which is available on the internet. With these data it is possible to explore geological data. For the research area two 3D models are available: DGM and REGIS II. The DGM model is able to build a 3D Model of the subsurface to a depth of 500 m. The model is based on 26,500 corings with a lithostratigraphical description. The REGIS-II model uses the same data but is more focused on hydrology.

The DGM data can be visualized with the use of the free application SubsurfaceViewer. Figure 5.11 and Figure 5.12 show several exports of this application. The Gulpen formation is clearly visible in these visualizations (Legend GU-q).

5.4.4 Results

As mentioned before, the top of the Gulpen formation is formed by the Limestone of Lanaye. These limestones are the bedrock of the Meuse River east of the Sint Pietersberg and have been eroded by the Meuse. So, large flint nodules may be found along the riverside. Outcrops of the Gulpen Formation are visible in the valleys of the rivers Geul and Voer. At the Jeker valley this seems not to be the case, as the bottom of the Jeker River valley is not touching the formation of Gulpen (Figure 5.12). Upstream, the Jeker River cuts through the Gulpen formation because of the dip of this formation in a northern direction. This is not visible in the DGM model as the model stops at the border of the Netherlands. Felder & Bosch\textsuperscript{10} state that the top of the Gulpen formation, which is the level of the Limestone of Lanaye, has been eroded south of the line

\textsuperscript{10} Felder & Bosch 2000.
Eysden-Gulpen - Vaals. This makes the occurrence of outcrops of the Limestone of Lanaye south of the Cannerberg unlikely.

The resolution of the DGM model is rather coarse. In chapter 5.3 the original presumed Neolithic level visible in the corings in the Jeker Valley is determined by pollen analysis.

5.4.5 Conclusions

With the use of the freely available data from the Geological Survey of the Netherlands it is made clear that the Limestones of Lanaye have outcrops near the Cannerberg. In prehistoric times, flint nodules originated from this layer could only be collected at several km from the Cannerberg. These flint nodules were probably not collected from outcrops in the Jeker valley.

**Figure 5.12**
Cross section of the Jeker and Meuse valley subsurface.
6 Test Trenching

Ivo van Wijk & Lucas Meurkens

6.1 Introduction

The test trenching campaign took place from November 26th until December 5th, 2012. Ultimately 5120 m² of the 7 ha large research area was trenched with 43 trenches. In total 221 features were documented and partly interpreted as natural or recent disturbances. The anthropogenic features were divided into three groups: postholes, pits and ditches. Most of the features date to the Early Neolithic (n=98), a smaller group (n=55) probably dates to the Iron Age – Roman Period. Three features convincingly date to the Roman Period.

<table>
<thead>
<tr>
<th>Anthropogenic features</th>
<th>N Natural feature</th>
<th>N Recent</th>
<th>N Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ditch</td>
<td>14</td>
<td>36</td>
<td>28</td>
</tr>
<tr>
<td>Post hole</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post hole with post shadow</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pit</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>subtotal</td>
<td>156</td>
<td>36</td>
<td>29</td>
</tr>
</tbody>
</table>

6.2 Bandkeramik features

The Early Neolithic or Linear Bandkeramik features were evenly distributed over the complete research area with a concentration in the northwestern part of the terrain. Most recognizable were long oval shaped pits filled with settlement debris with fragments of pottery, flint, stone and burned loam. In trench 13, the postholes were directly related to the refuse pit as three rows of postholes clearly indicated the presence of a Bandkeramik house structure. Several clusters of postholes, presumably dated to the LBK based on the fill (dark brown, sometimes with fragments of burned clay or charcoal), were documented in trenches 12, 21 and 43, probably being part of a larger structure. Most Bandkeramik pits in the other trenches are rich in settlement debris and were therefore considered long pits, situated along the Bandkeramik houses. The expectation was that in the vicinity of these long pits, structures may be present like in other LBK settlements.

6.3 Late prehistoric and Roman features

Late prehistoric and Roman features were harder to be distinguished from Early Neolithic features. These younger features have a yellow beige-light brown or greyish fill, sometimes with charcoal fragments, and their traces are more easily recognizable than the Bandkeramik ones as they stand out clearly from the surrounding brownish subsoil. Small clusters of postholes were found in five different trenches (Figure 6.3). Of particular interest were some round pits (approx. 1 m in diameter) in a row in trench 45. After cross sectioning they proved to be 1 m deep with a rather homogenous fill (Figure 6.4). The pit was presumably used as a storage pit or silo. Only one feature in trench 45 could be dated to the early Iron Age based on a fragment of a semi-cylindrical ceramic salt container. It is likely that more features date to the Iron Age.
Figure 6.1
Distribution map of archaeological features.
Figure 6.2
Distribution map of Bandkeramik features and possible locations of structures.
Legend
- Iron age
- Roman period

Figure 6.3
Distribution map of Iron Age and Roman features.
The somewhat loose distribution of Iron Age features is typical for (Early) Iron Age settlements in this region, being the result of small wandering yards. These yards are archaeologically hard to trace as they only leave relatively small concentrations of habitation features. Possible house yards or activity areas may be expected in the vicinity of trenches 24, 27 and 45 when considering the (small) concentration of features witnessed in these trenches.

Some features, in particular the ones in trench 12 and 18, possibly date to the Roman Period. South of these trenches Roman features were documented consisting of a wide ditch in trench 9 and a refuse filled depression in trench 11, on a slope ending. Especially the latter one contained a lot of material like wheel-thrown pottery (especially Belgian ware), fragments of a bronze fibulae and large lime stone fragments.

6.4 Other features (Late Medieval-Modern times)

Late medieval or more recent features were observed dispersed throughout the trenches, primarily in the northern parts of the research area (Figure 6.5). Most of the features may be described as patterned southwest-northeast orientated short and narrow ditches. In some of the trenches the same ditches were found but with a perpendicular orientation. The ditches measure a few meters till up to 12 m in length and have a width of about 60 cm. The colour of the fill is greyish yellow and resembles the fill of Iron Age and Roman features. However, their traces are better visible in the subsoil. During test trenching no late medieval and modern finds were documented.

When looking at the patterning of the ditches, more or less in relation with the natural relief as well as the absence of finds (although none of them have been cross sectioned), it seems clear that these features may not be classified as settlement features. A function as cadastral boundaries seems to be the most logical explanation although the dispersed patterning and shortness of the ditches still raises questions. For now the ditches are dated to the late medieval or modern times.
Figure 6.5
Distribution of late medieval and/or recent features.
6.5 Material culture

The test trenching campaign yielded a total of 2,948 finds. The majority of the finds were extracted from features. All finds were processed, meaning that they were separated into different categories (i.e. pottery, stone, flint, etc.), counted and weighted per find number. The find material seems to be well preserved although, as is typical for Dutch decalcinated loess soils, unburned bone is, apart from some found within Roman features, absent. The pottery barely shows evidence of weathering and lacks traces of manganese, indicating good preservation conditions. The finds of the test-trenching campaign are described in the excavation result sections.

<table>
<thead>
<tr>
<th>Find Category</th>
<th>N</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td>Prehistoric pottery</td>
<td>37</td>
<td>409</td>
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<tr>
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<tr>
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<tr>
<td>Roman import ware</td>
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<td>1564</td>
</tr>
<tr>
<td>Special ceramic object (complete vessel)</td>
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<td>43</td>
</tr>
<tr>
<td><strong>Construction material</strong></td>
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<td></td>
</tr>
<tr>
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<td>372,2</td>
</tr>
<tr>
<td><strong>Stone</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandstone</td>
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</tr>
<tr>
<td>Stone indet</td>
<td>76</td>
<td>9748,6</td>
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<td>Stone tefriet</td>
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</tr>
<tr>
<td>Flint</td>
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<td>2</td>
</tr>
<tr>
<td>Special stone object (adze)</td>
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<tr>
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<td></td>
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</tr>
<tr>
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<tr>
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<td></td>
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<tr>
<td>Animal bone</td>
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<td>57</td>
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</tbody>
</table>

Table 6.2
Different find categories within the assemblage.
Part 2

Dynamics in Early Neolithic habitation
7 The Linear Bandkeramik settlement

Ivo van Wijk

7.1 General remarks

The test trenching campaign revealed the outlines of a large LBK settlement on the Cannerberg. In line with the project outline, the excavation of the settlement was done in two fieldwork phases.

The excavation’s methodology focussed on the structure of the settlement and its immediate surroundings. For budgetary reasons it proved impossible to excavate the entire site. Therefore, during phase 1, long and wide trenches were dug that provided an overview of the settlement’s layout and extensions. In phase 2, we obtained a more detailed view by focussing on the settlement features, the various house yards and activity zones. The Iron Age settlement turned out to be more extensive than previously assumed, and more effort had to be made to excavate it in a decent way. As a result less could be excavated from the Bandkeramik settlement. Nonetheless we were able to document the largest part of the Neolithic settlement and to address all major research questions.

This chapter describes the various Bandkeramik house yards, (house) structures and related features.

7.2 Extent

During the excavation a concentration of Bandkeramik features revealed the outline of a relatively large LBK settlement (Figure 7.1). Features were found in an area of about 356 m in north-south direction and 185 m in east-west direction, its limits have not been reached everywhere. Probably only in the southeastern and western part of the research area the borders of the settlement are documented. Although features are still present in some western trenches it is evident that the outer skirts of the settlement have been reached there. The settlement continues most definitely circa 160 m further north as surface finds were still collected there. It is uncertain how far the settlement continues in easterly direction where a natural border is provided by the Jeker valley: the terrace edges are located at no more than 60 m east of the excavation. However, at the eastern border of the excavation, river gravels surface beneath the top soil. Despite some occasional pits dug into the gravel, these areas would probably be less preferred for digging holes. It can be said, therefore, that the settlement’s eastern borders extended with 60 m. The maximum area of the settlement would then measure 520 x 420 m.

7.3 Methodology

7.3.1 Description of the Bandkeramik structures

One of the icons of the LBK is the longhouse. It is known from its preserved subterranean features, which consist of linear clusters of postholes and external wall trenches. As the ground plan of a longhouse is easily recognized and quite similar in most parts of the LBK territory (although regional variations exist) a successful
Maastricht MillenniuMbos typology was created by Modderman and Waterbolk.¹ This typology divides the longhouses into three broad types:² the Großbau (known as type 1), Bau (type 2) and Kleinbau (type 3), which are based on a combination of three sections or modules, that may be further divided into different sub-types. Within each of these three sections and perpendicular to the long axis, rows of three posts are interspersed, creating rooms of different sizes and presumably also different functions.³

On the Cannerberg site we excavated the remains of 29 Neolithic (LBK) house structures. Most of them were documented in the field or reconstructed during the analysis; they are extensively described in the catalogue (Appendix 6). The structures are numbered 1 through 29. Most of them (n=25) were recognised during the excavation and four structures were added during the analysing phase. As a house is related to surrounding features which together constitute a house yard, we decided to define the house yard as the administrative entity and attribute structures and features accordingly.⁴

The length and width of the structures were measured from the centre of a posthole or ditch in either direction. The houses were described according to Modderman’s typology (Figure 7.2) in which Bandkeramik rectangular houses are subdivided into three sections: the north, middle and south parts⁵. In the western distribution area of the LBK (Rhineland, Graetheide) the houses are generally northwest-southeast orientated, yet the sections are labelled north, central, and south (in line with Central European practice).⁶ This proved to be even more ambiguous for the house plans of the Cannerberg settlement as most of the house orientations there are almost east-west (!). Nonetheless we decided to follow the common practice and label the western parts of the Cannerberg houses as north or northwest sections and the eastern parts as southeast or south sections. The function of the different house sections is still debated although it is more or less generally accepted that the middle section was the dwelling unit.⁷ Most though not all pits associated with the house seem to be aligned along this section. The northern part is rather variable in size; its function has been interpreted as a stable, though no conclusive evidence has been found to support this theory. The same is true for the southern section which is generally interpreted as a storage place with sometimes even a raised floor where grain or other vulnerable crops or products could be stored. Modderman suggested that the south part went out of fashion in the younger LBK due to changes in the social system. He suggested that in the early and middle phases of the LBK tripartite houses probably belonged to the most influential families in the community with a privileged position regarding the harvest, a position no longer existent in the younger phases.⁸ Little is known about the above-ground structure; however, it has been established that (as a rule) the walls consisted of a row of standing posts 50-80 cm apart with between them wattle-work, daubed with loam. Especially in the earlier phases of the LBK sequence the walls of the northern parts were constructed from planks placed in a ditch, thus replacing the wattle-and-daub

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4. It has to be stressed that structure numbers handed out in the field are different from those employed for the house yards in the analysis.
5. For various (mainly ethnographical) reasons Coudart 1998 presents a unitary model instead; yet her alternatives have not been accepted as yet by the larger community of specialists.
Figure 7.1
Bandkeramik features (structures, post holes and pits).
Figure 7.2
Typology Bandkeramik house-plans (after Modderman 1970, 111).
walls. In the larger settlements occasionally a three-partite house was built with wooden boards all around.\textsuperscript{9} Indications for an entrance are scarce but generally placed in the southern short wall.

### 7.3.2 Description of the Bandkeramik pits

Bandkeramik pits are distinguished based on position, shape and function, generally in relation to the houses.\textsuperscript{10} The most common types are: \textit{Längsgruben}, \textit{Kesselgruben}, \textit{Ringgruben} and \textit{Schlitzgruben}. The so called \textit{Längsgruben} or long pits are situated outside of and parallel to the houses. The long pits have been dug mainly to gather loam to daub the walls or to raise the level of the house floor.\textsuperscript{11} Micromorphological research carried out on long pits in the settlement of Elsloo proved that these pits were kept open and therefore could have served as water pits.\textsuperscript{12} Eventually they filled up and ended up as refuse pits. Hachem\textsuperscript{13} suggests that the loam pits were kept open for about one year because of the mixed slaughter ages represented in the animal bone assemblages and antler finds at Cuiry-lès-Chaudardes (Aisne valley, Paris Basin). Another estimate suggests that loam pits were gradually filled in a period of three to five years.\textsuperscript{14} It is generally accepted that the average loam pit had a gradual fill, rather than being filled in a single event.\textsuperscript{15}

Van de Velde showed that the volume coming out of the long pits was more than sufficient for providing loam to daub the walls and to raise the floor level. It is therefore tempting to assume that the loam of the long pits was put to other uses as well.\textsuperscript{16} As long pits are determined by their position in relation to the house, \textit{Kesselgruben}, \textit{Schlitzgruben} and \textit{Ringgruben} are named after their shape also. Most frequently present are the \textit{Kesselgruben} and \textit{Ringgruben}. \textit{Schlitzgruben} are hardly identified in Dutch LBK settlements. The \textit{Kesselgruben} or kettle pits have a flat bottom and straight edges in profile.\textsuperscript{17} They are commonly interpreted as silo pits or granaries although some reservations have to be made.\textsuperscript{18} \textit{Ringgruben} have a round or oval shape at the top and a bowl shaped bottom; their function probably varies. Still, most of the pits, regardless of their primary purpose, ended up as refuse pits. Above all, they are loam pits that subsequently served different purposes, for example as a granary, a place for pottery manufacturing\textsuperscript{19}, a refuse/manure pit, a water pit or watering place for stock, a fire place, a place to work with flint, a seat for the village council, a hang-out for the kids or a place for a ritual deposition. Mostly, sherds, flint, stone, burned loam, charcoal, (burned) bone and/or carbonized seeds and weeds are all that remain, which causes these pits to be classified as refuse pits. Additionally they function as artefact traps when out of (primary and secondary) use. It is therefore of utmost importance to make right assumptions when describing a cross sectioned pit since most of the time only a pit’s last use will archaeologically be shown. This is especially true for the v-shaped \textit{Schlitzgruben} or so called ‘tan-pits’. These pits are trench-like with a length that is double the width and a v-shaped cross-section. The

\begin{itemize}
  \item \textsuperscript{9} Modderman 1988, 93-94; Van de Velde & Van Wijk 2014.
  \item \textsuperscript{10} Boelicke 1982, 17.
  \item \textsuperscript{11} Modderman 1988, 104; Van de Velde 2007, 73-74.
  \item \textsuperscript{12} Huisman et al. 2012.
  \item \textsuperscript{13} Hachem 2011, pp. 181–184.
  \item \textsuperscript{14} Bedault 2012,pp. 68-69, 478.
  \item \textsuperscript{15} Bickle 2013, 156.
  \item \textsuperscript{16} Van de Velde 2007, 74.
  \item \textsuperscript{17} Boelicke et al. 1988: 300-304.
  \item \textsuperscript{18} See for instance Modderman 1988, 103-104 versus Van de Velde 2007, 76.
  \item \textsuperscript{19} Porreij 2000, 48.
\end{itemize}
filling shows a gradual filling but finds and settlement debris are generally absent as to give any clues to their primary function. With their function hardly known and probably varying per region\textsuperscript{20}, they are seldom seen in the Dutch LBK. Only three pits were identified so far.\textsuperscript{21}

There is an ongoing debate whether the long pits served as artefact traps or that refuse is discarded in the pits deliberately. As Bosquet \textit{et al.} stated, it is likely that refuse was first dumped in surface middens and then gradually displaced into the pits.\textsuperscript{22} According to them, only a small proportion of the waste material remains to be excavated while the rest from the upper parts of the pits or middens has been washed away by erosion after the abandonment of the settlement (mostly 0.5-1 m of the top layer is eroded or assimilated in the plough zone). Hachem\textsuperscript{23} opposes this view with evidence from the excavation of Cuiry-lès-Chaudardes (France) where kitchen refuse was decently thrown into the side pits of each respective house, suggesting a differential use of these pits.\textsuperscript{24}

In respect to the artefact traps it may be said that there is no quantifiable difference between the amount of finds in long pits close to the houses and in pits more astray.

A few years later Hachem\textsuperscript{25} reported the excavation of two Bandkeramik and Villeneuve-Saint Germain (VSG) longhouses at Jablines (near Paris) where 2500 m\textsuperscript{2} of the original Neolithic occupation layer was preserved. There, the occupation layer contained 72\% of the weight of all finds present, with the main deposits outside the houses along the walls (i.e. on top of the long pits). In the northern, rear parts of the houses complete pots had been preserved, probably indicative of special activities there, while the other parts of the houses had been kept clean. Major concentrations of flint behind the houses suggested working spaces there, whereas the area in front of (east of) the houses contained very little waste. The observations made by Hachem \textit{et al.} fit neatly with the results obtained at the site of Hanau-Klein-Auheim (Austria)\textsuperscript{26} where on the edge of a lower terrace near the floodplain a part of a settlement was excavated, also with an intact occupation layer. The stratigraphy of the finds suggests preservation in situ.\textsuperscript{27} In total 5 hearths, 16 quartzite chipping floors and the partial remains of 5 houses were found. Although only a small part of the settlement was excavated (672 m\textsuperscript{2}) spatial analysis of the large dataset showed that some areas were favoured for discarding although waste was found more or less everywhere around the houses. Contrary to Jablines, none of the pits were sectioned at Klein Auheim. It is important to welcome arguments stating that refuse in pits may correspond to activities outside instead of inside the house or to activities inside the house in a distorted manner, when refuse has been intentionally removed and deposited into a pit.\textsuperscript{28} It is clear, however, that waste management is not as straight forward as the finds in the remaining pits let us believe. Taphonomic studies are thus crucial\textsuperscript{29} but (are) hardly executed.

\begin{thebibliography}{99}
\bibitem{20} Van de Velde 1979a; Modderman 1988, 103.
\bibitem{21} Van Wijk 2002; Van Wijk \textit{et al.} 2012.
\bibitem{22} Bosquet \textit{et al.} 2008; Bosquet 2013.
\bibitem{23} Hachem 1997.
\bibitem{24} Hachem 1997; Van de Velde 2007, 74.
\bibitem{25} Hachem 2000, summarizing a report in a French interregional meeting (1991) by Bosquet, Hachem & Lanchon
\bibitem{26} Wolfram 2013.
\bibitem{27} Wolfam 2013, 80-82.
\bibitem{28} Pavlů 2012, 166.
\bibitem{29} Ilett \textit{et al.} 1982.
\end{thebibliography}
During the test trenching campaign it became clear that the visibility of the LBK features varied from good, especially the refuse pits, to poor visibility of the post holes. With depth, visibility increased and post holes were better visible (see test trenching pit 13, §6.2). The disadvantage was that when lowering the archaeological plane, the top layers (with most finds) of surrounding pits had to be dug away as well as the majority of the shallow wall posts. It was therefore decided not to lower the archaeological plane, since the primary goal was not the inner layout of the houses, but the settlement structure. In some cases additional posts appeared a few days after the archaeological plane was levelled, because of the ‘oxidation’ of iron in their fillings. Still, for most structures the inner layout remains somewhat obscure. To explain why these features are hardly visible, we tend to look at soil formation processes. From cross-sections it was evident that the upper part of the post holes was hardly visible as it tended to blend in with the surrounding subsoil and only became more visible on a deeper level (Figure 7.3). It looks like a soil formation process where minerals and humus wash down from the more recent topsoil, causing a ‘browning’ of deeper levels. This probably happened after the typical loess ‘radebrik’ soils were formed (§5.2).

As a result of the poor visibility of the features, an unknown amount of features were not recognised and documented. But in some cases features were identified when cross-sectioning other ones. For instance, LBK feature S786 was discovered when Iron Age feature S779 was cross-sectioned. It is a large pit with dimensions of $4.1 \times 3.5 \times 1.2$ m (Figure 7.4). We observed that LBK pits that contained hardly any finds or settlement debris like charcoal or burned loam are difficult to distinguish. In most settlements in the Graetheide region, however, this is hardly the case as these settlements are more densely populated and scattered settlement debris in the infills consequently raised the visibility of the features. As the Cannerberg settlement has a lower population density, features are more difficult to distinguish, especially those that are situated at the edge of the site.
### Table 7.1
Constructive details and ceramic phase of the house structures.

<table>
<thead>
<tr>
<th>House yard</th>
<th>length in m</th>
<th>width in m</th>
<th>type</th>
<th>area m²</th>
<th>orientation</th>
<th>degrees</th>
<th>shape</th>
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<td>trapezium</td>
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</tr>
</tbody>
</table>

#### 7.4 The longhouses

The Bandkeramik longhouse appears across a vast area of Europe stretching from Ukraine and Moldavia in the east to the Paris Basin in the west. The complex arrangement of internal posts was the basis for Modderman's typology which is still

valid.\textsuperscript{31} The different types of longhouses are found in most settlements, regardless of the settlement size and duration. Bandkeramik settlements are archaeologically characterized by house plans. The largest known Dutch site is Elsloo where 109 houses were excavated in what is possibly only one third (or even less) of the original settlement area.\textsuperscript{32} Other large settlements are Geleen-Janskamperveld\textsuperscript{33} with 69 houses, Sittard-Mgr. Claessenstraat with 55 houses\textsuperscript{34}, Stein-Keerenderkerkweg with 48 houses and Beek-TPE with 39 houses, all located in the Graetheide area (Table 7.2). Outside the Graetheide, in the area of Maastricht (the ‘Heeswater cluster’) known sites are Maastricht-Klinkers with 7 houses and Maastricht-Lanakerveld with presumably 8 houses\textsuperscript{35}. At Vlijtingen (just across the border in Belgium) 6 houses were excavated and at Rosmeer-Staberg 14 houses were documented.\textsuperscript{36} They probably all represent only a (sometimes small) part of an originally much larger number of houses still not excavated. In the Heeswatercluster the settlement at the Cannerberg, with at least 29 house structures, is the largest excavated village thus far. The structures are extensively described in Appendix 6.

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Fair/good recognisable</th>
<th>Total examined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beek-TPE</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Elsloo-Koolweg</td>
<td>74</td>
<td>109</td>
</tr>
<tr>
<td>Geleen-de Kluis</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Geleen-Janskamperveld</td>
<td>51</td>
<td>69</td>
</tr>
<tr>
<td>Sittard-Mgr. Claessenstraat</td>
<td>44</td>
<td>57</td>
</tr>
<tr>
<td>Stein-Keerenderkerkweg</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Stein-Heidekampweg</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Maastricht-Lanakerveld</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Maastricht-Klinkers</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Other sites Graetheide</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>239</strong></td>
<td><strong>338</strong></td>
</tr>
</tbody>
</table>

7.4.1 House types

As indicated before, 29 house yards have been documented of which 25 had traces of a house structure (Table 7.1). Most house plans were incomplete when excavated due to poor visibility. It was therefore difficult to establish their type and shape (see Appendix 6 for an argumentation for the selected types). We determined the types of 16 house plans, according to Modderman’s typology\textsuperscript{37}, of which 14 houses with a high degree of confidence: 1 possible type 1b-house, 10-12 type 2 houses and 4 or 5 type 3 houses (Table 7.1). What immediately strikes the eye is the almost complete absence of type 1b house plans, a phenomenon new to the Dutch LBK research (Table 7.3). The only possible candidate could be house 17 which has a wall trench in its north section. However, being only partially excavated, it remains unclear whether it is a type 1b or type 2b house; though its comparatively small width is not favouring the first possibility.

The exclusive presence of type 2 and type 3 structures within this settlement is unprecedented for the Netherlands. For example, the settlement of Elsloo-Koolweg yielded only 27 type 2 houses: that is 38% of the identifiable houses at this site. At the

\textsuperscript{31} Modderman 1970; Coudart 1998; Von Brandt 1988; Van de Velde & Van Wijk 2014.
\textsuperscript{32} Van Wijk & Porreij-Lyklema 2015.
\textsuperscript{33} Van de Velde 2007.
\textsuperscript{34} Van Wijk 2002.
\textsuperscript{35} Meurkens & Van Wijk 2009.
\textsuperscript{36} Roosens 1962.
\textsuperscript{37} Modderman 1970.
other settlements listed below the percentage of type 2 houses is ever below 30%. Absence of the south parts --and as such of definitive type 2 or 3 houses-- is a common phenomenon for the Youngest LBK although tripartite houses did certainly not entirely disappear.

<table>
<thead>
<tr>
<th>settlement</th>
<th>type 1</th>
<th>type 2</th>
<th>type 3</th>
<th>source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beek-Geverikerveld</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>Van de Velde &amp; Bakels 2002</td>
</tr>
<tr>
<td>Geleen-de Klus</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>Waterbolk 1959</td>
</tr>
<tr>
<td>Geleen-Janskamperveld</td>
<td>28</td>
<td>10</td>
<td>7</td>
<td>Van de Velde 2007</td>
</tr>
<tr>
<td>Stein-Keerenderkerkweg</td>
<td>16</td>
<td>8</td>
<td>5</td>
<td>Modderman 1970</td>
</tr>
<tr>
<td>Stein-Heidekampweg</td>
<td>5</td>
<td>-</td>
<td>2</td>
<td>Van Wijk et al. 2012</td>
</tr>
<tr>
<td>Maastricht-Lanakerveld</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>Meurkens &amp; Van Wijk 2009</td>
</tr>
<tr>
<td>Maastricht-Klinkers</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>Theunissen 1990; Van Wijk et al. 2014</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>106</td>
<td>55</td>
<td>35</td>
<td></td>
</tr>
</tbody>
</table>

### 7.4.2 Dimensions and shape

Reconstructing the dimensions of the house plans was difficult as many postholes were not visible in the archaeological plane. However, some comments can be made.

The length of the type 2 houses at Cannerberg varies between 6.8 m and 16.2 m and their width between 4.1 m and 6.1 m. Corresponding figures for the type 3 houses are between 4.5 m and 10.2 m and between 3.8 m and 4.7 m, respectively. The maximum length of house plan 18 is 20.6 m but its type is uncertain. Most of the excavated houses at the Cannerberg do not exceed a length of 15 m. In comparison with known house types on the Graetheide (Table 7.4) the average length (13.5 m) of the Cannerberg type 2 houses lies well within the average range (12.6-14.1 m). The average width (4.98 m) is evidently smaller than on the Graetheide. The type 3 houses are also somewhat shorter (average 7.4 m) and narrower (average 4.2 m).

<table>
<thead>
<tr>
<th></th>
<th>1a</th>
<th>1b</th>
<th>1c</th>
<th>2b</th>
<th>2c</th>
<th>3c</th>
</tr>
</thead>
<tbody>
<tr>
<td>total length</td>
<td>minimum</td>
<td>18.1</td>
<td>13</td>
<td>13</td>
<td>8.6</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>27.9</td>
<td>23</td>
<td>19</td>
<td>14.1</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>maximum</td>
<td>37.8</td>
<td>34.9</td>
<td>23.9</td>
<td>20.4</td>
<td>17.4</td>
</tr>
<tr>
<td>count</td>
<td></td>
<td>16</td>
<td>34</td>
<td>10</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>width</td>
<td>minimum</td>
<td>5.4</td>
<td>4.9</td>
<td>4.3</td>
<td>5.3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>average</td>
<td>7</td>
<td>6.1</td>
<td>5.6</td>
<td>6</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>maximum</td>
<td>8.7</td>
<td>8</td>
<td>6.9</td>
<td>7</td>
<td>7.8</td>
</tr>
<tr>
<td>count</td>
<td></td>
<td>23</td>
<td>51</td>
<td>19</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

A subdivision can be made between rectangular and more or less trapezoidal house outlines. On the Cannerberg 14 houses are rectangular and six houses slightly trapezoidal in shape. The trapezoidal shape, a phenomenon which is characteristic of post-Bandkeramik groups, is not very common in the Dutch LBK where most houses are rectangular. The known trapezoidal houses (like Elsloo-Koolweg house 9) are dated to the Youngest LBK (Modderman phase 2c-2d). The relatively large number of trapezoidal houses in this settlement does not seem to fit within the Dutch LBK but is more related to Belgian settlements further south and west where both rectangular and trapezoidal house plans are present.  

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38 Modderman 1988, 59.
The average orientation of Bandkeramik house plans per settlement differs per region. In addition, within settlements the orientation also varies. In Central Europe the orientation tends to be north-south, while in the western distribution area of the LBK, houses are orientated NW-SE and even W-E (Figure 7.5). In the Dutch LBK the most common orientation is NW-SE with the south section, where the house’s entrance is supposed to have been, facing SE. Still, variation between and within settlements exists and can sometimes be as much as 60° (standard deviation of 13.6).

Table 7.5 shows the (observed) variation in orientation per settlement. The settlement of Sittard differs somewhat from the other settlements by having a more N-S orientation in contrast with the other settlements which are orientated more S-E. The site of Elsloo-Koolweg shows the largest variation with orientations between 81° and 143°. On the other hand, this is also the LBK village with the largest number of (excavated) houses in the area.

There is still debate as to why the houses face a specific direction. An astronomical association seems to be farfetched given the wide variation within a settlement. An orientation towards prevailing winds is no option as the main wind direction would have been south to southwest which leaves the long walls full in the wind instead of only the short walls. Other sources mention the direction of the nearest sea, the source of the Danube or the direction to the land of the ancestors. Whatever the underlying reasons, it is obvious that a specific pattern or ritual existed which caused LBK settlers to construct their houses in a traditional direction; the reason why might already have been lost during the LBK period. It is of importance to realise that long-range exchange networks and long told oral narratives caused the Bandkeramians image of the world to be bigger than the plot of land he was farming on.

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40 Modderman 1988, 89.
41 Coudart 1998, 55 and 88-89; Pavlí 2000, 221.
43 Bradley 2001; Van de Velde 2008, 22.
The orientations of the house plans on the Cannerberg vary from NW-SE (132°) to W-E (94°), the average orientation is WNW- ESE (108°). Many houseplans were incomplete and, as a result, the observed orientations may differ slightly from the original ones. The incomplete house plans tend to have a more NW-SE orientation. The different average orientation of the Cannerberg houses in comparison to other known Dutch settlements initially caused some confusion during the excavation, as the layout of the house plans was expected to be NW-SE orientated. The orientation of a house plan is generally not tied to specific house type; both type 2 and type 3 houses have the same variation in orientation. Type 3 houses are somewhat more W-E orientated (avg. 103°) than type 2 houses (avg. 106°). The same is true for the difference in house shapes or the difference in phases of habitation. It is remarkable that the main orientation of the Cannerberg house plans is different from other Dutch LBK settlements; even settlements in the Maastricht area have a more NW-SE orientation. An explanation for this change in building behaviour is touched upon in the synthesis (chapter 18).

### Table 7.5

<table>
<thead>
<tr>
<th>Settlement</th>
<th>average</th>
<th>st.dev.</th>
<th>minimum</th>
<th>maximum</th>
<th>N houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beek-Geverikerveld</td>
<td>117°</td>
<td>13.6</td>
<td>100°</td>
<td>152°</td>
<td>19</td>
</tr>
<tr>
<td>Elsloo-Koolweg</td>
<td>110°</td>
<td>13.4</td>
<td>81°</td>
<td>143°</td>
<td>97</td>
</tr>
<tr>
<td>Geleen-de Kluis</td>
<td>127°</td>
<td>11.3</td>
<td>111°</td>
<td>145°</td>
<td>8</td>
</tr>
<tr>
<td>Geleen-Janskamperveld</td>
<td>127°</td>
<td>11.5</td>
<td>107°</td>
<td>162°</td>
<td>69</td>
</tr>
<tr>
<td>Sittard-Mgr. Claessenstraat</td>
<td>142°</td>
<td>8.4</td>
<td>126°</td>
<td>160°</td>
<td>54</td>
</tr>
<tr>
<td>Stein-Keerenderkerkweg</td>
<td>122°</td>
<td>7.6</td>
<td>103°</td>
<td>138°</td>
<td>48</td>
</tr>
<tr>
<td>Stein-Heidekampweg</td>
<td>131°</td>
<td>5.7</td>
<td>123°</td>
<td>142°</td>
<td>13</td>
</tr>
<tr>
<td>Maastricht-Lanakerveld</td>
<td>123°</td>
<td>7.8</td>
<td>114°</td>
<td>136°</td>
<td>11</td>
</tr>
<tr>
<td>Maastricht-Klinkers</td>
<td>127°</td>
<td>13.5</td>
<td>110°</td>
<td>141°</td>
<td>4</td>
</tr>
<tr>
<td>Maastricht-Cannerberg</td>
<td>108°</td>
<td>8.9</td>
<td>94°</td>
<td>132°</td>
<td>29</td>
</tr>
</tbody>
</table>

7.4.4 Chronology of the houses

One of the most challenging tasks in an intra-site analysis is dating the various houses and their yards. Radiocarbon dating is more or less unfeasible because of irregularities in the calibration curve for the LBK era, allowing only the Oldest and Youngest LBK period to be radiometrically dated. Organic materials are badly preserved in the decalcified loess soil in the area which makes dendrochronological dating unfeasible. The common practice is to rely on pottery typology. The Dutch chronology of the LBK is divided into two main phases (“Old” and “Young”) and subdivided into three and four sub-phases (respectively 1b to 1d, and 2a to 2d; Figure 7.6). The pottery typology of Modderman is generally used for Dutch and Belgian sites. Studies of the German sites in the Rhineland usually make use of the pottery typology made by Dohrn-Ihmig which was refined for local relative chronologies by Stehli and interregional comparative studies by Stehli and Strien.

For this study we used the typology of Modderman, and to be more specific, the reworking of Modderman’s typology by Van de Velde. As will be explained in chapter 8, additions made by Van de Velde allow a finer chronology divided into 20 ceramic phases instead of the 7-fold periodisation Modderman used. The assumption that the (long) pits along the walls are the waste dumps of these houses enables dating the houses by means of the decorated pottery. In the present excavation, however, not enough decorated pottery was found due to limited cross-sectioning.

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44 Modderman 1970.
45 Dohrn-Ihmig 1976.
47 Stehli & Strien 1986.
48 Van de Velde 1979a; Van de Velde 2014.
We stress that a chronology based on pottery is nothing less and nothing more.\(^49\) It is a chronology of decorated sherds and we have to take into account all different kinds of pre-depositional processes that take place before these sherds wind up in the pits beside the houses (with many bridging arguments to connect sherd dates and house dates). Another problem is that we don’t know how long a ceramic phase lasts nor whether a phase is as long as any other. Especially for ceramic phases 18-20 or Modderman phases 2c-2d it is assumed that they lasted longer than previous phases. In Belgium, chronology attempts were made to obtain a more detailed subdivision in these last two phases.\(^50\) Considering all reservations, the use of decorated ceramics to date the different houses is as good as it gets when trying to date the settlement development.

At the Cannerberg site 20 houses out of 29 could be dated based on pottery decoration and superposition (Appendix 7). The ceramic phases for the houses range from phase 9 until phase 20 or Modderman phase 1d to 2d (Table 7.1, Figure 7.7). House 11 has been indirectly dated because one of its roof bearing middle posts was dug through pit 140 which dates to ceramic phase 18. The post was therefore erected later than phase 18, probably phase 19 or 20. House 5, which remains somewhat obscure probably dates from before ceramic phase 13. Three pits were dated by C\(^{14}\) analysis (Pits 807, 2304 and 2454). All three pits were attributed to the youngest phase (ceramic phase 20). Fortunately the sample from pit 2304 proved to be of use and provided a date of 6035 ±40 BP. This dates the pit to 4995-4850 BC (1 sigma) and therefore provides the

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49 Van de Velde 1979a, 120.
50 Blouet & Bosquet in prep.
The date for pit 807 (6110±40) covers the whole LBK period and the sample from pit 2454 (8030 ±40) is of no use as well. The latter may be accounted to the small sample of cereal grains available which clearly was not sufficient.

When looking at Figure 7.7 it becomes clear that a certain rhythm is present and that the houses are evenly distributed chronologically, with about two or three houses per ceramic phase. Potentially, the houses may be grouped into five different habitation phases. If the eight undated houses are taken into account an extra house could be assigned to each phase. This means that the settlement consisted of three (or four or more, if houses lasted longer than one ceramic phase) different house yards per ceramic or habitation phase. Although only a section of the settlement has been excavated this even distribution of houses over the ceramic phases is remarkable. It seems reasonable to suppose that the nine non-ceramic houses may evenly be spread over time also (see §7.7).

7.5 Yards

7.5.1 The ‘Hofplatz’ model

Houses and their associated features (pits, fences, etc.) are characteristically the main focus points of an excavation. Still, most of the houses and pits are described and analysed separately as each forms its own domestic unit or material container. It is in the long pits that the remains of the household are thought to have been collected over the use-life of the house. The long pits function as an uncomplicated record of household activities.\(^{52}\) Other opinions about the origin of the remains in the pits do however exist (§7.3.2).\(^{53}\)

Van de Velde and others also addressed the problem regarding the term ‘house’ as in LBK context every excavated house plan is customarily labelled ‘house’.\(^{54}\) Additionally the term ‘yard’ or ‘Hofplatz’ was introduced which precisely refers to the archaeological

\(^{51}\) Other samples that are dated to the Youngest LBK in the Netherlands are based on charcoal (Lanting & Van der Plicht 1999/2000).

\(^{52}\) Coudart 1998, 73.

\(^{53}\) Bosquet et al. 2008; Bosquet 2013.

\(^{54}\) Van de Velde 2007, 238.
deposit of a group that inhabited one or more buildings i.e. a house in a sociological sense. A yard is such a house’s premise plus its appurtenances like (storage or refuse) pits, ovens, fences, dumping areas and its grounds: the domestic space. For the German literature a ‘Hofplatz’ is conceived as the area around every single building/house, usually extending 15-20 metres to either side.

The Hofplatz model or single homestead or yard model, as first presented by Kuper and Boelicke, and followed here) distinguishes a standard configuration on the yards of pits in relation to the houses in the Langweiler 8 settlement, based on a number of general assumptions (Figure 7.8). The most important premise is that only one house existed in any one yard at any one time. For subsequent houses and neighbouring yards a minimal distance was proposed of a 15-25 m radius. The yard incorporates the long pits (adjacent to the house), east, north and west pits, and other pits that fall within the 25 m radius. This way, a yard can be identified containing sufficient pits with dateable (decorated pottery) material. If long pits were absent then either the east, north or west pits were used as long as they contained any datable material. Pits beyond the 25 m perimeter were not included as they may have been used by the entire community instead of a single household, especially when on the periphery of a settlement. With this in mind Appendix 6 was constructed. It describes the house as a single unit together with a description of the pits that are thought to be related to the house: the yard or single homestead.

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55 Van de Velde 2007, 238.
56 Kuper et al. 1974; Boelnicke 1982; Claßen 2006; Zimmermann 2012.
59 Zimmermann 2012.
60 Kuper et al. 1974, 308, 326-333; Lüning 1982, 142-144.
It remains unclear whether a similar standard unit may be valid for other LBK settlements. It is accepted that in settlements with low spatial pressure the position of the various pits around the houses and mutual distances are irregular. It may be clear that we have to surpass the already acknowledged relation of long pits to the houses, although examples of houses with no associated long pits –like at the Cannerberg–exist. Therefore we have to look at other types of pits that may be present on a yard. Van de Velde tried a comparable study on the yards of Geleen-Janskamperveld but the outcome remained inconclusive as the density of features precluded such standardisation; unfortunately this holds for most Dutch LBK settlements. He also proposed the idea that the social organisation in the Dutch settlements may have differed from that in the Rhineland: Dutch houses were organised in yards in a lineage-like organisation (ward), while in the Rhineland each house(hold) seemed to be on its own and more mutually independent, hence the layout of their yards differed as well. To test these ideas about the structure of a yard it is of importance to have relatively isolated houses within a longer lasting settlement. As the Dutch settlements hardly provide any good test cases due to the high density of features, the Cannerberg settlement seemed a promising candidate based on the test trenching.

7.5.2 Yards and space

The Hofplatz model has been challenged on several occasions. In this paragraph the focus is on the spatial dimensions of a yard. Especially the radius (space between the house structure and the limits of the yard) provides one of the main problems of Boelicke’s Hofplatz model. In the schematized drawing of the model (Figure 7.8) a 25 m radius is proposed. This radius is measured from the central axis of the house and more in particular from the central/middle section of the house. This indicates that the yard’s edges are at 20–25 m from the centre of the house. In the model this signifies that a house yard has an area of 50 by 60 m, totalling 3000 m² (Figure 7.8), varying with the length of the house structure. That way the yard covers a distance of 15–20 m from each side wall of the house to the edge of the yard. For smaller settlements the 25 m radius was probably larger as a result of more space available. If the model is applied to the Cannerberg yards, we can take the average length (12 m) and average width (4,8) of the houses and calculate the average size of a yard, per Boelicke. An average yard would then measure 35 x 42 m = 1470 m². This is considerably smaller than the Rhineland model suggests, but the average length and width of the Cannerberg houses is also smaller. Yet, at first glance even this area seems to be too large as most putative yards would overlap each other (Figure 7.9). If we take into account that not every yard was contemporary, there is sufficient space to establish a yard per habitation phase. As a test, we assumed a smaller area for a yard (ca. 1500 m²) to see whether this would be sufficient to test the Hofplatz model regarding the spatial distribution of the pits.

Too rigid a definition of the yard or domestic space, however, does not reflect past site organization as the activity area need not have been oval/rectangular but most probably had an amorphous or continuously evolving form due to changing physical

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61 Boelicke et al. 1988, 989; Zimmermann 2012; Link 2012a; Staüble 2013, 235.
64 Boelicke 1988, 328.
66 Boelicke 1988, 330 and 896.
68 Boelicke 1988, 330.
Figure 7.9
Covered area by ‘Boelicke’s yards’.
barriers (e.g. an abandoned house or pit cluster) or social/psychological barriers (e.g. the relationship with the neighbour). Variations in the domestic space should therefore be accounted for, even when there may have been general rules. These ‘general rules’ are described in the Hofplatz model where a model layout is suggested for the yard and where finds in pits represent domestic activities in and around the yard (§7.5.4 and §7.5.5).

To get a notion of the space between the yards used for the settlement at a particular habitation phase we attributed decorated pottery to the various house yards in order to distinguish different habitation phases. Although we think we are able to recognise successive habitation phases to define settlement development, we have to be careful, as they tend to represent the lifecycle of a yard as an isolated phase (see §7.7.1) with a fixed starting point and end. However, such a lifecycle cannot be considered equal in length for every yard; this does not reflect our thoughts and ideas about past everyday routine. For example, there are no indications, such as burning, that houses at the Cannerberg were erected and/or abandoned at one particular moment. House yards will therefore gradually have blended into each other as they are used by subsequent generations. The dating of a yard, according to the ceramic dating, will not exclude that the yard was already in use in previous or subsequent ceramic phases. It has to be considered an average date and therefore we have to ‘read’ the dating of a yard actually as a ‘habitation phase +/- 1’.

Figure 7.10 shows the house yards at the Cannerberg plotted per ceramic phase. It gives an overview of the space between house yards during a specific ceramic phase but also an indication of the total amount of space (area) covered. It shows that the space between subsequent house yards seems to be sufficient and almost no overlapping of yards occurs. Only houses 15 and 16, which are adjacent to each other, may be regarded as an exception to the rule that only one houses existed per yard if inhabited at the same time.

7.5.3 A matter of size

The smaller size of the house yard (ca. 40 by 35 m) employed above (as opposed to the substantially larger dimensions proposed in the Hofplatz model) proved to be sufficient to analyse the spatial distribution of contemporary pits on a yard. However, a larger area could also have been used, even for the Cannerberg. There, contemporary pits occurred which also could have belonged to a house yard, situated at 33 m from the house. This might also be the case when a yard’s outline and structure is more amorph and less rigidly defined than the schematic rectangular shape of a model Hofplatz. With a larger yard area conceivably more overlap between contemporary yards exists, an option probably closer to past behaviour than the bordered yards we now reconstruct merely to use a yard as an analytical unit.

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69 Stäuble 2013, 235.
70 Bickle 2013, 155.
71 Bickle 2013.
72 See also Czerniak in prep.
Is the *Hofplatz* model applicable to and useful for the Cannerberg settlement? At first anticipations were high, because of the expected low density of occupation of the settlement, indicated by the test-trenching campaign. However, the excavation proved that occupation was (considerably) denser than expected and the distribution of the house yards showed significant overlap, although not between contemporary house yards as is stated above. It is therefore difficult to attribute the various pits to specific houses. Even the long pits, generally seen as directly related to the house, are sometimes absent or not at all related to a house. As Table 7.6 shows not all houses have long pits adjacent to the structures. Of the 29 houses only nine have long pits on both sides of the structure. Ten structures have only one long pit along the western long side, and five have a long pit on their eastern long side. Occasionally north pits are present (n=6), and most of the time they are silo pits. The eastern and western pits of the model occur regularly on both sides of the houses. For six houses only one eastern

**Figure 7.10**
House yard per ceramic phase. Previous and subsequent ceramic phases ('habitation +/- 1') are greyed out. Scale 1:5000.
pit was counted as opposed to two on the western side. Other pits are relatively scarce but when present (n=9), they are located south of the house. Noteworthy is the number of silo pits present on the yards. Most of them have been dated by ceramics and could therefore be attributed to a yard. At least half of the yards are believed to have a silo pit.

<table>
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<th>House yard</th>
<th>Long pit East</th>
<th>Long pit West</th>
<th>North pit East</th>
<th>North pit West</th>
<th>Other pits East</th>
<th>Other pits South</th>
<th>Other pits West</th>
<th>Other pits North</th>
<th>Silo complete yard (75% excavated)</th>
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We attributed 375 pits to the LBK settlement, equalling 31 pits per ceramic phase. Given the number of yards per ceramic phase (2-4) this would result in a maximum of 8-10 pits per yard; probably fewer as pits were also located outside the yard area. Although it is hard to establish the exact number of pits per habitation phase, these numbers (8-10 pits per yard) do not appear too high when considering the probable duration of a house yard (15-25 years). This would indicate that the LBK people were not as fond of digging pits as is generally believed. But we also have to consider the option of reopening or rejuvenating pits. Micromorphological research done at long pits at the LBK settlement of Elsloo showed that some pits had been kept open allowing them to function as water reservoirs as well, at least for those particular cases.74

In total 26 silos or kettle pits have been identified (Figure 7.11). These pits are straight walled, flat bottomed, round or oval pits (Figure 7.12). The depth of the features ranges

73 Huisman et al. 2012, 127.
74 Mention worthy is the fact that unburned bone was found in the primary filling which is unusual for these decalcified grounds.
from 50 to 134 cm beneath subsoil with an average of 82 cm. This average fits nicely within the range and average depth of the kettle pits of Geleen-Janskamperveld. The large number of these pits present in settlements suggests the regular need for them, possibly for the storage of seeds for the next harvest.75 Almost all of the pits at Cannerberg are located within the yard area. This indicates that silo pits were dug in close proximity of the house, sometimes up to three per yard. This compares to the site Beek-Gevenikerveld where one or two silo pits have been associated with each house.76 On the Gevenikerveld these pits were located to the south of the rear part of the structures, which is southwest of the house.77 At Geleen-Janskamperveld 80% of the kettle pits were located close to the houses, sometimes up to ten pits to one house yard. The majority of the houses had 0-3 pits, just like at the Cannerberg settlement where almost all silo pits are located within the yard area.78 Up to five pits per house were reported at the Aldenhovener Platte settlements Langweiler 2 and 9.79 Chronologically, probably two to three silos were in use per ceramic phase at the Cannerberg. Apparently the silo pits with their seed corn contents had to be kept under supervision or guarded close to the houses. A practical place would have been in the direct vicinity of the fields probably situated not within the settlement, but on its outskirts or even further away. Some silo pits have charred layers on the bottom of the pits, which suggests that they were burned on the inside. By burning weeds or old or germinated seed-corn the pits were kept clean and could be re-used.

In a few areas of the excavation, clusters of pits have been encountered. These pits were dug next to or through each other. The clusters looked like a large depression in the subsoil, but once sectioned a cluster resolve into different pits. These pit clusters are regularly found at Dutch LBK settlements. One of the largest is located in Elsloo and consists of over ten different silo pits.80 At Cannerberg, pit clusters are present north of house 29, south of house 13, between houses 16 and 19 and between houses 14 and 20. Ceramic dating suggests that these pits were sometimes in use for several ceramic phases, in turn suggesting that these spots were repeatedly visited activity zones. Sometimes these clusters are made out of silo pits but probably had other functions as well.

7.5.5 Distribution of finds

The primary function of a pit (i.e. loam pit, silo pit, etc.) signifies its spatial relationship to the house81. Its secondary function relates to the house yard. The artefacts excavated from these pits are a result of their secondary or (as Stäuble put it) x-transformed function.82 The location of the pits and their content represent different moments in time.

The artefacts in the pits are our main source for analysing activities that happened in or around them. Interestingly, the artefacts in the pits will not always be representative of or represent the activity (structured or symbolic deposition) which took place in and around the pits.83 Other factors like the discard practice and later transformations

76  Van de Velde & Bakels 2002.
77  Van de Velde & Bakels 2002, 45.
78  Van de Velde 2008, 78-79.
79  Boelicke et al. 1976, 309.
80  Van Wijk & Porreij-Lyklema in prep.
81  Stäuble 2013, 235.
82  Stäuble 2013, 235.
Figure 7.11
Distribution of silo or kettle (like) pits.
Figure 7.12
Silo or kettle pits in cross-section (from left to right 5651, 697, 226, 1282, 1982, 1937, 2038, 2199, 2311, 493, 1771, 1804 and 1929, 2113, 1363 and 2304 and 2494, 2497).
through taphonomic processes play an important role as well and these could possibly skew our perspective of what really happened. Thus the artefacts deposited in the pit are only a small portion of the number of artefacts ever left behind: most of the surface or near surface finds have gone.

In order to make some cautious assessments about the distributions of the finds we first looked at the number of finds retrieved from the various pits. We retrieved in total 24,514 separate objects (Table 7.7) originating from 103 pits attributed to specific house yards and 137 pits which may or may not have belonged to a house yard. Almost one third of the excavated pits (n=375) contained no finds at all. When pits with 10 finds or less (n=120) are included in this latter group, the number of findless pits increases to two thirds of all the pits. Moreover, not all pits have been cross sectioned, while some other pits were only half-excavated. Finally, some contents were wet sieved during the excavation. A comparison of absolute numbers of finds between pits is unfeasible because of different excavation strategies. Nonetheless some distinct differences can be noted. The average amount of finds retrieved per pit is 100, but only 37 pits yielded more than 100 finds. Pit 2210 alone yielded ca. 7000 finds; the rest of the 37 pits did not contain more than 500 finds. Most finds (70%) are thus retrieved from less than 15.4 % of the pits. Over 50% (122 pits) contained hardly any finds (10 finds per feature or less). Most objects in these pits are considered settlement debris.

It is striking that there is such a big difference between pits filled with settlement waste and pits which have hardly any finds in them, suggesting substantial variation in discard practices in which some pits were used secondarily as waste pits, while others remained unused. The question arises whether this diversity in discard practises is the result of a rapid (intentional), or ‘slow’ (natural) filling of the pit. Although both processes can coexist within the same pit we must not forget that we only have the bottom part of the pit and its fillings. It is unclear in which way (intentional or natural) the top layers were filled. We therefore cannot declassify the discarding practises in pits as unsuitable for making estimates about site activity or yard activity. As a large (top) part of the pit is missing, it is difficult to establish a time-factor on the basis of the analysis of the pit fillings. The way in which the bottom layers of a pit were filled is suggestive for the primary use of a pit. Because of the documented differences in the filling of the bottom layers and the unknown state of filling of the top layers it is difficult to classify findless pits. A findless bottom layer may not exclude a find rich (unpreserved) top layer. However, it may provide an indication of the way a primary filling was composed (find rich or findless). Still, it is an interesting study to see if there is an absolute difference in the distribution of finds within pits within the settled area.

<table>
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<th>category</th>
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<td>Stone fragments/artefacts</td>
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<td>Burned clay fragments</td>
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<td>Charcoal fragments</td>
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<tr>
<td>Bone fragments</td>
<td>34</td>
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Table 7.7
Total amount of finds retrieved from LBK pits.

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84 For some pits the total amount of flint was not counted because of the large quantities. Also charcoal, burned clay and bone are better considered mere indications of the total amount due to fragmentation.
85 Still, only half of the feature was excavated and sieved.
86 Bosquet et al. 2008; Stäuble 2013, 237-238.
Figure 7.13
Find distribution (absolute and relative) per dated pit not attributed to a house yard.
Figure 7.14
Find distribution (absolute and relative) for all dated pits.
We examined whether there is any difference in the composition of waste in the pits over time (ranging from ceramic phase 9-20). As this involves only pits dated by ceramic analysis, sufficient pottery had to be present in the pits. The data is therefore biased from the outset because not all pits were similarly excavated or yielded the same amount of decorated pottery and undated pits that belonged to a yard were not included in the comparison. Nonetheless, some trends are visible (Figure 7.13). The total number of finds increases from phase 14 until phase 17, but after that returns to the same level as before phase 14. Strangely enough the relative amount of flint discarded in phases 14-15 is comparatively less. In phase 11-12 and 16 there seems to be comparatively more flint present. The total number of flint was highest in the final phases (16-20) of the settlement. We remain somewhat unclear as to why these differences appear. Both pottery and stone fragments were discarded in quantities similar to flint. It has to be mentioned, however, that these pits are not directly attributed to a house yard, although a relation with a house yard is not excluded. When these pits (inside and outside a yard) are included (Figure 7.14), a similar pattern arises, where the relative distribution differs within each phase during all phases. It is therefore a uniform pattern, where in some pits merely more pottery, flint or stone has been discarded. From phase 12 onwards, the total number of finds rises significantly but that doesn’t mean that the number of finds rises in all younger dated pits: the youngest pits eventually produce less refuse. Therefore, it is a uniform pattern where in some pits respectively more pottery, flint or stone has been discarded.

When looking at the find assemblages in non-house related pits only a few pits stand out in terms of amount of finds per pit. Pits 46.11, 321, 893, 1963 and 1965 all have over 300 finds each; three times more than the other pits. Their relative compositions are similar to the other pits; only the total numbers of finds differ.

The near-empty pits are distributed all over the settlement. It therefore appears that the discarding of refuse was apparently a deliberate action. Pits with only a few finds (20 or less) may be pits that remained open for a longer time and were slowly filled in with soil together with some settlement debris.

On the other hand, it may be stated that infilling with larger quantities occurred on more than one occasion. Pit 46.11 provides a good example: next to this pit several sherds were found lying on top of each other as if deposited at once. At least four vessels (out of 23 pots in total) in the refuse have been discarded in the pit; over 20 sherds per vessel were retrieved from the pit. Similar waste care can also be inferred from pits 46.27, 272, 500, 640, 697, 700, 702, 724, 744, 754, 807, 893, 948, 983, 1248, 1942 and 2210 in which more than 20, and up to 62, sherds per vessel were found. Most of these vessels are undecorated coarse ware.

The Cannerberg settlement contributes to the discussion on waste management and the relationship between refuse pits in activity areas within the domestic space. First, the number of pits without or with hardly any finds is larger than that of the pits with finds. Second, there seems to be some preference in waste discarding strategies as some pits have far more finds than others (this may be biased as excavation strategies differed in some cases). And finally the amount of sherds fitting together in various pits suggest that at least some (parts of) vessels were discarded in one deliberate action. Still, the question remains whether the refuse was discarded directly into a pit or was first thrown on a heap or midden, later to be dumped into a loam pit.
Some conclusions about the find distribution may be drawn from a general analysis of the settlement data. The main focus of this excavation was on distinguishing and comparing the different house yards. Since the settlement proved to be more densely inhabited than initially assumed, and it therefore proved to be more difficult to distinguish house yards one from the other, a small number of house yards was selected for in-site analysis.

A number of house yards was selected to study the find distribution in and the layout of yard. This was done accordingly to the pits that are believed to belong to a specific yard and which were sectioned during the excavation. Special attention is paid to sectioned long pits as they generally contain many finds and may reflect the domestic activities that took place in or around the house yard.

![Figure 7.15](image)

**Figure 7.15**
Total amount of finds per house yard.

<table>
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<tr>
<th>75% or more pits sectioned, dated</th>
<th>less than 75% of pits sectioned, dated</th>
<th>undated</th>
<th>sieved pits, dated</th>
<th>no finds, undated</th>
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<td>sieved</td>
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**Table 7.8**
Finds per house yard, total counts.
Table 7.8 and Figure 7.15 show the finds (pottery, flint and stone) per house yard. Clearly there is a great variation in the amount of finds per house yard. This variation may not reflect the ‘original’ find distribution because some of the features have not been sectioned, others only half and only a few completely. Additionally, some pit contents have been sieved; also because of the small flint fragments not all pieces have been counted. In other words, it is difficult to compare the different house yards with each other by their absolute quantities. However, they can be compared relatively by means of the percentages of the finds per house yard.

Suitable yards of which find distributions could be analysed were selected based on two parameters: (1) at least 75% of the pits of a yard had to be sectioned and (2) could also be dated by ceramics. Potential candidates were yards 1, 4, 8, 12, 15, 16 and 22. Yards 15 and 16 seem to overlap or may have been contemporary and are therefore left out of this analysis. Yard 4 will be discussed and compared, too, although the fillings of some of its features have been wet sieved. House yard 4 remains somewhat enigmatic as it is probably overlapping another such structure (yard 5). House yards 1, 8, 12 and 22 comply with the given parameters and are discussed below.

House yard 1 (ceramic date 13):
Directly along the structure a number of pits were excavated. Pit 2093/43-12 is a long pit with a remaining depth of only about 55 cm. There are two charcoal rich layers on its bottom. On the same side of the building there is another pit (2092) with a comparable filling but lacking the distinct charcoal layers. On the other side of the house three more pits are situated. Pit 226/2151 has the same filling as pit 2093/43-12. On the same side lies pit 2131. The eastern long pit (2093/43-12) and the southern pit (226/2151) yielded the most finds. Flint was most abundant.

House yard 8 (ceramic date 14):
The building is flanked by five pits (755, 754, 753/2054, 774 and 775/2053) that all seem to be (parts of) find rich long pits. The depths reach down to 100 cm below the excavation plane for pit 753 and 40 cm for pit 774. Pits 753/2054 and 775/2053 have a layered filling, which suggest a rapid filling of the pits. The other pits all showed a gradual filling process. The eastern long pit (754) and the southern pit (775/2053) yielded most finds. Pottery was most present.

House yard 12 (ceramic date 18):
Two large long pits (pits 27 and 45) flank the central part of the house. At a lower level, the pits could be separated into a small number of individual pits with a common filling; another five pits surround the house. It is not certain that these pits belong to this house’s yard. Pit 140 lies on the “northern” (western) short end of the house. Only pits 27, 45 and 140 have been sectioned.

Pit 140 has a layered filling, showing at least three different charcoal layers. The thin layering on the bottom of the pit suggests that the pit has been used for water storage. At a later stage it seems that another pit has been dug into the earlier one, suggesting re-use.

The western long pit (27) and the northern pit (140) yielded the most finds. The amount of stones from pit 27 is striking when compared to other features. This may indicate that this pit could be related to domestic activities where stones or stone tools were used, after which they were discarded here.
**Figure 7.16**

House 1, numbers of finds per pit (left) and percentages (right).

**Figure 7.17**

House 8, numbers of finds per pit (top) and percentages (bottom).
Figure 7.18
House 12, numbers of finds per pit (links) and percentages (rechts).
House yard 22 (ceramic date 12):
All of the pits on this yard have been sectioned except for pit 2047. Pit 2039 is a large long pit reaching down to 93 cm below the excavation plane. It seems to consist of two or more long pits. The pits were gradually filled. Pit 2043 has a more distinct layered profile and is 52 cm deep. Pit 2046 is the shallowest with 29 cm. Most finds come from the western long pit (2039).

House yard 4 (ceramic date 13):
A total of twelve pits surround this building. At least two pits (1964 and 1976) can be classified as long pits. The other pits (1975, 1940, 1939, 1963, 1965, 702, 709, 710, 1979 and 700/1980) or all oval or round pits. Not all pits belong to this yard but pits 700/1980, 702, 710, 1964 and 1976 were attributed to house yard 4. Among them, pit 700/1980 is most remarkable: it has a diameter of ca 5.9 m, a depth of over 100 cm and it cuts into pit 1979. This pit originally consisted of at least three smaller (silo) pits which after their primary use have been covered by a large darker filling. This filling contained the most finds of the pit. The bottom filling of the original pits 700/1980 indicates a gradual infilling with almost no finds. However, on the bottom, and centrally positioned in the pit, a large stone was deposited. A similar phenomenon is known from the site Elsloo-J. Riviusstraat.\footnote{Van Wijk & Porreij-Lyklema 2015, pit S2.246 from house 97.} The single finds of a large stone, possibly used for grinding, suggest a deliberate deposition.
It is not certain whether pit 700/1980 can be related directly to the house. Apart from pit 700/1980 the long pits yielded most finds among which a lot of flint. Almost half of the fillings of pit 700/1980 and 1964 have been wet sieved.
In comparison, not all pits attributed to the various yards contain equal quantities of finds (Figure 7.21). There seems to be no apparent pattern within our data to support the idea that similar positioned pits on a yard or similar type of pits were used for refuse disposal. At yards 1 and 22 only the eastern long pit and the southern or northern pits were used, but both long pits at house 4 and 12 were filled in with refuse as well. A pattern that does arise is that only one or two pits were selected to deposit most of the refuse. This implicates that a kind of waste management was in order, although variations do exist, and we are missing the top fillings of the pits due to erosion.

A few other patterns are visible. It is evident that house yard 1 has significantly more flint within its assemblage and house yard 12 has significantly more stone finds than the other yards. Analysis of the various artefacts has to prove whether there are actually more stone or flint tools present and whether these can be related to specific domestic activities (see chapters 8-10). It is important to look at the variation within the assemblages. For example, a high number of flakes may represent knapping activities in the vicinity of the pit just as a small number of stone tools found within a pit may be related to a special activity also. It is thus important to get a perspective of the specific types of artefacts that were discarded. Furthermore, a common waste distribution pattern exists with 30-40% of the assemblage made up of pottery and a similar percentage of flint, supplemented by a smaller percentage of stone finds. Some pits may also contain burned clay, fragments of burned bone and/or charcoal, reflecting of domestic activities in the yard.

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88 Pit 700/1980 will be left of the comparison because part of its contents have been wet sieved, which makes it difficult to compare it with other pits.
In conclusion, the contribution of the various find categories differs per yard. The analysis of these differences, which includes the question whether they reflect special activities like flint knapping, manufacturing of pottery or food preparation, will be carried out by the specialist material studies presented in chapters 8 to 10.

**Figure 7.23**
Site plan after removal of houses and yard features
7.6 Isolated features

Features have primarily been classified as either postholes or distinct types of pits, the majority of which are attributed to yards. However some isolated features remain unclassified. The next paragraph will focus on the contents of these features and their shape or structure.

7.6.1 Pit complexes

At the Cannerberg settlement, we observed four different pit complexes: three in the northern part of the excavation and one in the south. Two of the northern complexes have been dated to ceramic phases 13 and 15. They cannot directly be related to a house yard but were presumably part of a Wohnplatz as an area that was used and reused. Pit complexes are groups of pits, mostly kettle pits that consist of multiple overlapping parts. Pit complexes are positioned outside the immediate surroundings of the house or even outside the yard. A fine example of a pit complex has been found at the excavation of Elsloo-J. Riviusstraat, which is part of the settlement of Elsloo-Koolweg, where a pit complex of nine features covered an area of 9.5 x 9.3 m. They represent a series of kettle pits or silo pits which have been dug one after another as the previous pit collapsed or had gone out of use. Due to their long time of use they are potential palimpsests and have to be handled carefully when used for ceramic dating or when relating them to a specific yard. The pits at the Cannerberg were primarily used as silo pits or stores where seed-corn was kept. Their secondary use was mostly as artefact trap for refuse in their vicinity. In two cases (pits 2080 and 2210) we interpret the secondary use for the intentional deposition of flint (see below). Both pit complexes yielded over 70 kg of flint, which exceeded by far the normal expectation of settlement debris eventually ending up in the filling of a pit.

Pit complexes represent particular activity areas within the settlement of which it is unclear whether they are part of a Wohnplatz or are to be considered as 'sub-yard' areas where activities took place that superseded daily LBK life.

7.6.2 ‘Flint working’ pits

During the test-trenching campaign it became clear that some pits yielded vast quantities of flint far exceeding the traditional expectation of classical LBK pits where flint makes out an equal share within the assemblage. When excavated it appeared that these pits (2080, 2210 and 2454) have a lot of similarities, but differ in some ways, too.

Pit 2080 is part of a pit complex and has a distinct top layer which yielded the most finds. The pit measures 6.7 by 8.5 m and reaches 1.9 m below surface. The primary filling shows a homogenous filling (layer 4) which contained some finds like pottery, flint and stone. Originally the pit consisted of a series of kettle pits, which could still be recognised in Figure 7.24. On top of the rather homogeneous filling a dark brown top filling was present which primarily contained flint, but also some pottery, burned bone

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89 A ward comprises a group of several adjacent contemporary house yards, its inhabitants presumably related by kin ties; in the larger settlements, two wards make up the village (Van de Velde 2008).
90 Lüning 1977, 74-76.
92 Lüning 1977, 75; Van de Velde 2007, 86-87.
and ochre fragments (Table 7.9). The presence of only a single decorated pottery sherd fragment prohibited ceramic dating.

Pit 2210 is a comparable but slightly smaller pit complex (5.5 by 6.1 m), reaching 96 cm deep. Again, the pit complex consisted of different kettle pits. The bottom of the top layer yielded the majority of finds, especially flint but also quite a large amount of pottery, burned bone and stone. This pit dates to ceramic phase 15.

<table>
<thead>
<tr>
<th>Find category</th>
<th>2080</th>
<th>2210</th>
<th>2454</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Weight (g)</td>
<td>Count</td>
</tr>
<tr>
<td>Pottery</td>
<td>76</td>
<td>567.3</td>
<td>477</td>
</tr>
<tr>
<td>Flint</td>
<td>&gt; 520</td>
<td>24303.6</td>
<td>Ca. 10,000</td>
</tr>
<tr>
<td>Stones</td>
<td>36</td>
<td>6449.1</td>
<td>1300</td>
</tr>
<tr>
<td>Ochre</td>
<td>2</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>Bone</td>
<td>9</td>
<td>4</td>
<td>9.9</td>
</tr>
</tbody>
</table>
Pit 2454 was located directly south of house 18. It differs considerably from pits 2080 and 2210 in terms of size and filling. The pit is oval in shape, measures 1 by 1.5 m and reaches 74 cm deep. Because of its kettle shape the pit is considered a silo pit. Its layered filling suggests a rapid filling in various stages (Figure 7.26). During one of the first stages of filling a layer (layer 3) of circa 20 cm thick developed filled with large amounts of flint and some pottery and stone fragments. After this deposition the pit gradually filled in with loess and occasional finds. The pottery dates this pit to ceramic phase 20.

All three pits have, apart from size and find assemblage, considerable similarities regarding the composition of the flint assemblage but also the way in which the flint was deposited. The composition of the find assemblage will be discussed in detail in chapter 9. The analysis of the flint assemblage showed that it is composed of almost every aspect of flint production. It contains the first stages of flint knapping as well as the end stage of the process, which resulted in the production of blades. In the three pits the flint was found in a compact layer. The find layer was so dense that hardly any soil occurred between the flint pieces, which made it almost impossible to excavate by hand. For that reason the complete layers of half of these features were sieved, the other halves still remain in situ. The dense filling suggests a very rapid deposition of the flint and the other artefacts. A gradual deposition of the artefacts would be visible as thin layers of washed-in surrounding soil in the cross section; this was clearly not the case. Moreover these three pits had originally been silo pits in silo pit complexes which after disuse first filled in slowly before the massive amounts of flint were deposited. Two more pits (6.1 and 34.1) that will yield comparable amounts of flint if excavated, probably have to be considered as ‘flint working’ pits too. Almost all are located on the edge of the wards or at least on the outside of a yard.

This suggests a deliberate action by the inhabitants or by a flint knapper on the edge of the domestic space where massive quantities of flint, the refuse but also the products of a flint workshop, were deposited in a specific type of pit. It is intriguing to consider what kind of event has happened before these pits were filled: a cleanup of refuse from a flint workshop or a more ritualized event? We prefer to think of it as a ritualized event due to the composition of the assemblage.
Figure 7.27
Distribution of 'flint working’ pits and structures.
During the excavation a ‘tan’ pit (2499) was found which was positioned in the centre of the settlement. The so called ‘tan’ pits or Schlitzgruben are to be considered typically LBK although their function is still under debate.\textsuperscript{93} ‘Tan’ pits are narrow, trench like features and V-shaped in cross section; generally no finds are retrieved from them. Their orientation varies. These pits are frequently found in the Bavarian Danube region and the Paris Basis but are relatively scarce.

The ‘tan’ pit of the Cannerberg measures about 3.9 by 2.7 m and reaches 1.7 m deep; its orientation is WNW-ESE. No finds were retrieved during cross sectioning. In the Netherlands only three Schlitzgruben are known, one each at Stein-Heidekampweg; Sittard-Mgr. Vranckenstraat and Geleen-Haesselderveld West.\textsuperscript{94} Although a fourth now has been added, its function still remains unknown to us.

\subsection*{7.6.4 Fences}

At various locations in the settlement, we observed postholes in linear arrangements that do not seem to be related to house structures. Based on other sites, we interpret them as fences or palisades. The orientation varies from NE-SW to WNW-ESE. They are composed out of a single row of posts or as a double row. Comparable fences or palisades were documented at Geleen-Janskamperveld\textsuperscript{95}, Stein-Heidekampweg\textsuperscript{96} and Sittard-Mgr. Claessenstraat\textsuperscript{97}. In general, these structures appear when all other yard features have been left out during feature analysis\textsuperscript{98}, or when they are singled out as a structure in the settlement as was the case for the palisade at Sittard-Mgr. Claessenstraat.\textsuperscript{99} Their function is to divide or to enclose a certain area. At Cannerberg the fences may have guarded small garden plots on the yards or constituted some kind of enclosure of a cluster of houses or a single house yard.

\section*{7.7 Settlement dynamics}

\textit{Ivo van Wijk & Piet van de Velde}

As mentioned before, the settlement counted 29 Bandkeramik house yards; perhaps some more may be expected northwardly beyond the excavation area (Figure 7.1). The houses and their yards are situated in a relatively oblong area subdivided into three adjoining zones: a southern, a central and a northern zone, measuring ca. 270 m by 110 m, roughly 3.5 ha; when adding dissociated Bandkeramik features the total area covered is 350 x 250 m. Apparently the settlement’s northern limits have not been reached as amateur archaeologists surveying the fields there have also retrieved Bandkeramik artefacts at distances of up to 250 m. In the three habitation zones within the bounds of the excavation the features occur in concentrations. Outside the clustered areas more or less isolated features are present, representing past activities away from domestic space.

\begin{thebibliography}{99}
\item Van de Velde 1979a; Modderman 1988, 103.
\item Van Wijk 2002; Van Wijk et al. 2012.
\item Van de Velde 2007.
\item Van Wijk et al. 2012.
\item Modderman 1959; Van Wijk 2001.
\item Van de Velde 2007, 82-83.
\item Modderman 1959.
\end{thebibliography}
7.7.1 On the spatial and chronological distribution of house yards

Not all of the settlement area was simultaneously in use. The ceramic analysis showed that the house yards were inhabited successively, one after the other. With time the settlement limits expanded as new yards were cleared. In the initial phases of the habitation the northern and central parts of the excavated area were used. The inhabited area then shifted gradually to the south and eventually clustered in the southeast when new yards were opened to the east and the south of the older nucleus, and the northern yard was given up (Figure 7.28).

The relative chronological positions of the houses are based on the decoration of the associated pottery but there is no indication to the duration of the ceramic phases\textsuperscript{100}. Apart from that, opinions also differ on the life-span of single houses. Physically, the wooden construction with large, rugged roof posts could probably have withstood the elements for up to a hundred years, if duly maintained;\textsuperscript{101} however, it is another matter how Bandkeramik society dealt with its houses. While the construction could have lasted a century, the social relationships it housed might not.\textsuperscript{102} Excavations of LBK settlements\textsuperscript{103} in the Graetheide and on the Aldenhovener Platte provided a model for the life cycle of a longhouse, based on the archaeological remains, especially ceramics, in the loam pits.\textsuperscript{104} The various studies suggested (as has generally been accepted) that a house was probably inhabited for 20-30 years\textsuperscript{105}, if not even shorter than that.\textsuperscript{106} A new generation built a new house probably close to the one belonging to their parents, at the edge of their yard.\textsuperscript{107} This rather short lifespan has been questioned by Rück and others suggesting a duration of circa 80 years, related to the possible technical age of the constructions.\textsuperscript{108} The problem with this proposition is that it implies a much larger population size. According to Van de Velde and others the probable, much shorter lifespan suggests that social factors rather than wear and deterioration played important roles in the cycles of the houses in LBK society.

\textsuperscript{100} By definition, there are 20 ceramic phases spanning the duration of the Dutch LBK, together some 250 years; probably the later phases are shorter in calendar years than are the earlier ones in this statistically defined sequence; cp. Van de Velde 2014 in Van Wijk et al. 2014.
\textsuperscript{101} Van de Velde & Van Wijk 2014; Bakels 1978; Von Brandt 1980; Schmidt et. al 2005; Rück 2007.
\textsuperscript{102} Bickle 2013.
\textsuperscript{103} Modderman 1970; Boelicke1982; Lüning 1988; Boelicke et al. 1997
\textsuperscript{104} Stehli 1989; Bickle 2013, 156.
\textsuperscript{105} Modderman 1970; Modderman 1988; Stehli 1989.
\textsuperscript{106} Van de Velde 2008; Van de Velde & Van Wijk 2014.
\textsuperscript{108} Rück 2007, 144.
Figure 7.28
Structures and zones of habitation.
Whatever their lifespan, the use of the different houses did not map as neatly on isolated phases as the ceramic phasing might suggest. A building’s life blends more in from one phase to another, also ceramic dates are averages computed on amalgamated data.\textsuperscript{109} The length of a lifecycle in years is therefore not the same for every house but is dependent on the alternation of the generations, i.e. social time, associated with it. Bickle\textsuperscript{110} states that a house must be regarded as an ongoing process rather than a unique point in time\textsuperscript{111}, a site of ongoing debate and contested social reproduction.\textsuperscript{112} The development of a settlement is therefore a dynamic process where houses were being built or broken down continuously and parts were re-used. We have to assume that the building of the houses was not a marked event where all houses in the settlement were built or destroyed simultaneously. The need for building a new house or setting up a new yard was induced by social factors like the passing of its main inhabitant (elder), and/or the changing role of the heir of the family which may have been demonstrated by the erection of a new house.\textsuperscript{113}

For the Cannerberg settlement an average lifespan of the houses of 15-20 years is considered. But even completely independent of this discussion it appears that different houses were (re)built within each zone. Yards do not overlap during a ceramic phase, even not in successive ceramic phases (Figure 7.29).

7.7.2 Wohnplätze

The relative pottery chronology allows us to date the various features when a sufficient amount of decorated pottery is associated. The inaccurate nature of these "dates" (rather: "phase spans") should be stressed again: the present site has relatively few ceramic containers, which is suggestive of a long life for them, resulting in an inexact chronological position relative to the other pots/features/houses\textsuperscript{114}.

With regard to the spatial distribution of house yards in time, the Hofplatz model should be introduced. That model was developed in the analysis of the excavations on the Aldenhovener Platte; its first description could (almost literally) have been written for the Cannerberg settlement instead of Langweiler-8.\textsuperscript{115} There, the same problems were encountered and the same solutions proposed. The Hofplatz model has two important aspects: (1) the mean relative life span of a house and (2) the inner structure of the inhabited space in and around the house.\textsuperscript{116} In Bandkeramik excavations the very prominent houses, including their immediate surroundings, are the obvious foci of analysis. By determining the mean relative use life of a house, associated features of preceding and succeeding houses can be averaged out. The spatial extension of the joint area of successive yards is called the Wohnplatz\textsuperscript{117} or inhabited space.\textsuperscript{118} Differences in size of the various, even successive yards, are explained accordingly. As to the inner structure of the inhabited space or Wohnplätze in larger settlements, two different types of house arrangements are proposed: in parallel rows (Parallelreihung)

\begin{footnotesize}
\bibitem{109} Zimmermann 2012, 13-14; Bickle 2013.
\bibitem{110} Bickle 2013, 155.
\bibitem{111} Carsten & Hugh-Jones 1995; Boivin 2000; Gerritsen 2008.
\bibitem{112} Souvatzi 2008, p. 45.
\bibitem{113} For example De Grooth & Van de Velde 2005, 230.
\bibitem{114} This point has also been stressed in Zimmermann 2012.
\bibitem{115} Boelicke, von Brandt, Lüning, Stehli & Zimmermann, 1988
\bibitem{116} Zimmermann 2012, 13-15.
\bibitem{117} Zimmermann 2012, 13.
\bibitem{118} To calculate this large high density settlements are needed although successive houses are also to be expected at smaller sites because of the presumed building tradition of the yards (Lüning 2001, 414; Zimmermann 2012, 14).
\end{footnotesize}
Figure 7.29
Yards and features per ceramic phase. The maximum extent of the settlement is shown by a single line, the area of the yard is visualised surrounding the building. Previous and subsequent houses are in grey.
For lack of decorated pottery nine houses at the Cannerberg could not be dated, which hindered the analysis of the structure and size of the Wohnplätze. We therefore attempted to relatively date these houses by looking at their position within the settlement (Table 7.10), in particular relative to the houses that could be positioned in time through their associated pottery\textsuperscript{120}...as had been done in the Langweiler-8 study.

We assumed that a yard does not belong to a certain phase if it had been (partly) built upon in the immediately previous or subsequent phases. The best possible match was then selected in respect to clusters of features of the same phase and the position of other contemporary yards. For instance: house 27, neatly situated in the centre of the northern Wohnplatz, was assigned to phase 12 as the other undated houses were on other Wohnplätze, and a (ceramic) chronological gap occurs between the houses 2 (phase 11) and 1 (phase 13); admittedly, a chronological position of this house in phase 15 (between the houses 29 and 3) or in phase 17/18 (later than house 3) can also be defended.

This deduction differs from the Hofplatz model where it is expected that when a house within a Wohnplatz is abandoned a new house will be constructed.\textsuperscript{121} As it turned out to be too difficult to distinguish specific Wohnplätze, we emphasized the amount of free space needed for a new yard. Figure 7.30 therefore is a combination of the best possible ‘fit’ of the space available to resurrect a new yard together with the presumed relation with a Wohnplatz. Based on the pottery chronology and the ‘thought experiment’ above, a Wohnplatz at the Cannerberg is composed of possibly only four contemporary yards (Figure 7.30). It therefore seems that only one ward was present at this settlement; when the possibly occupied area outside the excavation limits is taken into account too, there may have been two wards. Figure 7.30 shows the yards that have been identified per ceramic phase. Its shows the area which was used at more or less the same time. The area between contemporary yards and features between yards represent activities outside the yards. The settlement structure that emerges shows a pattern where two yards originally constituted the settlement which soon grew into four contemporary yards; towards the end of the settlement, three yards were still in use. Throughout time yards shifted positions within the Wohnplätze. As it

\begin{table}[h]
\centering
\begin{tabular}{cccccccccc}
yard & 9 & 10 & 11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 \\
\hline
5 & x & x & x & & & & & & & & & \\
9 & x & x & & x & x & x & & x & & & & \\
10 & x & x & x & x & & x & & & & & & \\
21 & x & x & x & x & x & & x & & & & & \\
26 & & & & & x & x & & & & x & & \\
27 & x & x & & x & x & & x & & x & & & \\
28 & x & x & & & & x & & x & & & & \\
17 & x & x & x & x & & x & & x & & & & \\
24 & x & x & & & & & & & & & & \\
\end{tabular}
\caption{Undated houses best position (in bold) per ceramic phase, best possible candidate is highlighted in grey.}
\end{table}

\textsuperscript{119} Lüning 2005; Zimmermann 2012.
\textsuperscript{120} Zimmermann 2012, 15-16.
\textsuperscript{121} Zimmermann 2012, 15.
appears, a new yard is laid out on the edge of an established yard, and is from there on continuously shifting positions.

In this model, a tacit assumption is that succeeding houses and their yards are representative of social succession: the heir to an estate/house builds a new estate/house near to his/her ascent; socially minor relatives either stay in the earlier house, join the heir, or disappear to establish a new house yard elsewhere. It may also be assumed that the heir carries (at least initially) the same status as his/her predecessor: generally successor LBK houses are of similar construction and size. What singles out the present hamlet is that 27 out of 29 houses have almost equal sizes (the two exceptions, H5 and H28, being much smaller to about one third the size of the other ones), which is suggestive of an egalitarian society --again, quite unusual as far as the LBK in this general area goes. From our chrono-spatial analysis we concluded that there were between two and four Wohnplätze on the Cannerberg: WP-I in the northern part of the excavation (phases 10-17), WP-II in west-centre (phases 14-20), WP-III in east-centre (phases 10-19), and WP-IV in the south (phases 12-19.) It cannot be excluded that there have been one or two additional Wohnplätze to the North of the excavated area, but we have no proof of that.
Turning back to the archaeological content of this site, we compared the pottery, flint and stone finds, first per yard and then per Wohnplatz to get an indication of which domestic activities may have taken place on which yards (Figure 7.31). It is apparent that Wohnplätze 1 and 2, and to a lesser extent Wohnplatz 3 yielded relatively more flint than other Wohnplätze. The relative amount of stones tends to be higher when either more pottery or less flint is present. This may represent a division in domestic activities as larger amounts of flint could relate to special activities such as wood and hide working, blade production and hunting. A higher relative amount of stone and pottery may point towards grinding, vessel manufacturing and/or food production. However, this remains a provisional statement as a more detailed study of the artefacts is needed to obtain insight in the kind of refuse.

7.7.3 Outside the yards and wards

Generally the domestic space is addressed when sites are studied. Within the settlement on the Cannerberg some spaces hint at special activities which superseded regular/customary everyday life. Most prominent among these is massive flint knapping in particular places, a practice which has not been found and documented on such a scale for the LBK in the Southern Netherlands, although smaller scale
examples are known from Beek-Kerkeveld and Sittard-Mgr. Claessenstraat.\textsuperscript{122} Outside
the settlements, we also believe that inquiries have to be made as to which activities
happened there, e.g. on the cultivated fields. Bogaard states that the lifespan of the
cultivated fields outlasted that of a house and that the latter was closely tied to social
relations, or kinship.\textsuperscript{123} However, the activities on the cultivated fields still remain
somewhat obscure in the archaeological data whereas the result of cultivation is
readily visible in burned seeds retrieved from silo or refuse pits.

Figure 7.9 shows all house yards combined which cover almost all excavated
Bandkeramik features in the settlement. We have to take into account that some
unexcavated yards are present outside the research area. Therefore, the village area
would have been larger. Still, the presented data shows a glimpse of the inhabited area
with its various Wohnplätze and even of the area that lies beyond: the outside activity
zones.

Although LBK features are found all over the excavated area some distinct
concentrations outside the inhabited space are visible just west and southwest of
the Wohnplätze. The features there vary from postholes to pits; no distinct feature
alignments with respect to any structure have been found. It is therefore inferred that
these areas lie outside the yards and represent outside activities. Several of these
features are pits and some have been cross sectioned, showing variations in shape and
size. It is remarkable that in this outside area no silo pits have been found, implying
that the latter were dug only near the houses and that apparently the inhabitants had
special rights towards their contents.

The find distribution (Figure 7.31) shows that 21 more find rich pits\textsuperscript{124} outside the
inhabited area are situated in the direct vicinity of the Wohnplätze. Still, they have a
relatively low amount of finds (60% less than 50 finds per pit), apart from pits 335/336
and 893. These latter pits are situated west of the inhabited area and have yielded
respectively 220 and 527 finds, of which over 50% consisted of pottery fragments. Their
contents are not different from ‘normal’ refuse pits on the yards in terms of quantities
of decorated and undecorated pottery and composition of the find assemblage

\textsuperscript{122} Beek-Kerkeveld (De Grooth 1994) and Sittard-Mgr. Claessenstraat (Modderman 1959).
\textsuperscript{123} Bogaard 2004; 2011.
\textsuperscript{124} 15 out of 21 pits however have been cross sectioned.
(percentage pottery, flint and stone). This might indicate that these pits do belong to a house yard outside the excavated area. The same situation applies for some pits directly south of house yard 17, itself the southernmost house in the excavation. The high amount of pottery in these pits suggests an unexcavated yard there, too.

With this in mind, attention is drawn again towards features 6.1 and 34.1. Pit 34.1 lies in the vicinity of the earlier mentioned pit 893 and could therefore be part of the same unexcavated house yard. Pit 6.1 is located over 60 m south of the most southern cluster of Bandkeramik features. There are hardly any features in its vicinity and those that are, yielded no finds. Although pits 6.1 and 34.1 have not been sectioned a lot of finds (n=256 and n=286) were gathered from them. Over 96% of these finds consisted of flint; but also some stones and pottery fragments were collected. Since they have not been sectioned questions still remain about the primary function of these pits and the variation in the rest of the assemblage. We think these pits are similar to the flint working pits 2080 and 2210 which yielded enormous quantities of flint artefacts. However, pits 6.1 and 34.1 are smaller than the brim-full pit complexes more to the north (1.75 and 3.5 m in diameter versus 7.4 m of pit 2080, and 4.7 m of pit 2210). The large quantities in these pits show that special activities like flint knapping apparently took place outside the inhabited area. This provides another dimension to the extent and scale of domestic space in this village.

7.8 Conclusion

This chapter describes settlement features, especially in relation to the various yards, each around their own house. The house yard is used as an analytical unit for the spatial distribution of pits and finds. There is a considerable variety in the number of pits on the yards as well as in their relative positions on the yards; there is also a great variation in the total amount of finds per house yard. Noteworthy is the presence of silo pits on most of the yards, stressing the importance of these features. The find distribution analysis showed that not all pits were used as refuse pits. Therefore some kind of waste management seems to have been in order. Stunningly, less than a third of the pits contained almost all the finds. That is, most pits are without finds at all or with settlement debris only. A comparison of find distributions within and between pits, contemporary or not, showed that the find assemblages did show a wide variation. A pattern appeared at most yards where silo pits were present. Within and outside the yard areas features have been excavated that are not that common in the Dutch LBK, such as Schlitzgruben and pit complexes. Special attention was paid to a number of flint working pits that probably had a special function within the settlement.

The various yards can be attributed to four Wohnplätze, the actual small village inhabited during a certain period of the settlement. The village was probably made up by at the most four different contemporary house yards (not counting those that may or may not have existed outside the excavated area.) The settlement structure that comes forward shows a pattern where two yards originally founded the settlement and eventually grew to four contemporary yards, later dwindling to three such spaces, and finally ending with desertion of the place. The various yards shifted positions within the settlement with new yards being built on the borders of a pre-existing, built-up yard. It can be concluded that the Hofplatz model is to a certain extent applicable for the Cannerberg settlement but a different pattern is proposed for the Wohnplätze.
Pottery is an important find category in LBK research. The decoration on LBK pots serves to order the associated finds (pseudo-)chronologically. This mends one of the major difficulties in this branch of archaeology, the impossibility to generate precise radiocarbon dates for this period because of a ‘wiggle’ in the calibration curve (reversal). Pottery decoration changes over time in a structured way, just as any social phenomenon. Decorated pottery makes up about one third to a half of the LBK’s ceramic inventory, so this change allows a fairly sharp relative ordering of the finds and features associated with decorated pots. Although a relative chronology (before/after, earlier/later) is easily obtainable, the quantification of chronological differences (x years before; for y years) is impossible: there is no ground for supposing that changes in the decoration occurred with a chronologically uniform rate.

Apparently, the decoration on their pottery was important to the LBK people. A not too intricate or diverse standard repertoire appears on all their decorated pots with nothing ever outside that canon. The meaning of this uniformity is only partially understood. For the entire existence of that culture the LBK potters employed but two motifs (the wave and the spiral) executed either in a rectilinear fashion (zigzag, meander) or curvilinearly (wave, spiral), in two- to fourfold along the circumference of the pot bellies. Never a union of recti- and curvilinearity has been observed on one pot; also, wave and spiral patterns never occur together. In between these motifs small secondary motifs are sometimes found, which have been explained as

<table>
<thead>
<tr>
<th>Modderman phase</th>
<th>Ceramic phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1b</td>
<td>1</td>
</tr>
<tr>
<td>1b</td>
<td>2</td>
</tr>
<tr>
<td>1c</td>
<td>3</td>
</tr>
<tr>
<td>1c</td>
<td>4</td>
</tr>
<tr>
<td>1c</td>
<td>5</td>
</tr>
<tr>
<td>1c</td>
<td>6</td>
</tr>
<tr>
<td>1d</td>
<td>7</td>
</tr>
<tr>
<td>1d</td>
<td>8</td>
</tr>
<tr>
<td>1d</td>
<td>9</td>
</tr>
<tr>
<td>2a</td>
<td>10</td>
</tr>
<tr>
<td>2a</td>
<td>11</td>
</tr>
<tr>
<td>2a</td>
<td>12</td>
</tr>
<tr>
<td>2b</td>
<td>13</td>
</tr>
<tr>
<td>2b</td>
<td>14</td>
</tr>
<tr>
<td>2b</td>
<td>15</td>
</tr>
<tr>
<td>2c</td>
<td>16</td>
</tr>
<tr>
<td>2c</td>
<td>17</td>
</tr>
<tr>
<td>2c</td>
<td>18</td>
</tr>
<tr>
<td>2d</td>
<td>19</td>
</tr>
<tr>
<td>2d</td>
<td>20</td>
</tr>
</tbody>
</table>

But see below, in the final section of this chapter, the sherd of SF 454 from feature S 1976.
markers (name plates) of family lines. Then the opposition of recti- and curvilinear execution of the motifs has been associated with the matrilinear organization of the Bandkeramik world. By imputation the wave/spiral symbolism should relate to their kinship organization, too, but the ‘how’ question has yet to be answered. In the general description of the pottery associated with the Cannerberg LBK houses, I shall specify the decoration’s recti- and curvilinearity.

The next section of this chapter will dwell upon some issues of method and sampling of the LBK pottery from the Cannerberg site. Then, general characteristics of that pottery will be detailed, followed by an attempt to specify the function of the inventories. The chronology of the site’s pottery is discussed in the following section, and in the succeeding paragraphs the pottery is described house-wise. A set of pictures of selected sherds with their descriptions concludes this chapter.

8.2 Method and sampling

To start with, the sherds from an excavation are only a sample of the pottery presently available on the site. They have been taken from those features that were searched on the Cannerberg, a little less than half of the pits visible in the field. Altogether, a sampling fraction of (almost) 50% constitutes a rather large and therefore highly representative sample. ‘Representativity’ has the meaning here of incorporating all archaeologically relevant variation. Then, from the selected features/pits generally one half was registered by hand-picking and sieving the pits’ contents. The secured finds are the basis of our inferences about the kitchen inventories at the Cannerberg site.

The finds provide a fair estimate of what remains hidden in the other, unexcavated halves of the pits. In other words, from the size of the sample (approximately 50%) it follows that hardly any “Sherd Family” (i.e., the sherds that remain of one and the same pot) in the excavated pits has been missed, at least not in a qualitative sense. The very same argument is valid to the relation of excavated features and non-excavated ones. That is, our finds provide a highly representative sample of the archaeological universe on the Cannerberg. Therefore, when one of the conclusions states that a LBK household in this village had x ceramic containers at its disposition (accumulated over the years that it occupied one house), this x-figure will not be far off the real, lived LBK experience: half of the pits excavated does emphatically not mean that they used twice as many pots as recovered.

8.3 General remarks: pottery from the Cannerberg

The Cannerberg excavations have yielded 4313 sherds (ss) deriving from 558 undecorated coarse sherd families (proxy for ‘remains of one vessel’) or ‘SFs’, 8 finger decorated vessels and 314 spatula decorated pots—the counts of the sherds per SF are rendered in Table 8.1 (as usual, the finger decorated ware is incorporated in the coarse category in Table 8.1 & Table 8.2). Both numerical distributions in that table are unremarkable: about a quarter of all SFs is represented by only one single sherd each (entries on the first line of the table), accounting for 4% of the coarse sherds (totalling 3298 sherds in this excavation) and 10% of the decorated sherds of the 1015 in this collection.

---

2 e.g. Claßen 2005.
3 Van de Velde 1979b.
4 Orton et al. 1993.
In descriptions of LBK sherds generally a distinction is made between decorated ware and coarse ware, as has also been done in Table 8.1. However, a class of ‘decorated’ ware logically implies the existence of a class of ‘undecorated’ ware; similarly, ‘coarse’ pottery is the opposite of ‘fine’ pottery. The logically implied classes do exist, indeed: in every collection there are numbers of undecorated LBK sherds which otherwise do qualify as fine ware, as well as remnants of decorated coarse/thick-walled pots.

Admittedly the decoration on these latter sherds is different from that on the fine ware in that it generally consists of rows of finger tip punches (rarely, plastic strips have been applied), contrasting with the incised spatula decoration on the regular, thin-walled pots. Also, more often than not the sherds of the ‘undecorated fine ware’ are slightly thicker than those of the decorated group. Then, the numbers of these (evaded?) classes are much smaller than those of the customary groupings. The undecorated fine ware sherds are generally grouped with the decorated pots for reason that decorated LBK pots have not been decorated all-over (the lower parts/bottoms are not embellished; mostly, the bottoms are slightly thicker than the pot walls), so they may occasionally have left undecorated sherds only. The decorated coarse SFs are conventionally entered into the tables as ‘coarse ware’.

The counts of sherds averaged per Sherd Family can be used for estimates of the loss, and beyond that of the original number of pots at the Neolithic site. Based on a numerical simulation an average of 3.2 sherds per Sherd Family (as of the fine/decorated ware; Table 8.1) is suggestive of a loss of slightly over 80%, leaving about 92% of the pots/SFs still represented; corresponding figures for the coarse ware: 5.8 ss/SF, 86%, and 95% of the SFs still present. Pushing these figures, about (100/92)*308 = 335 decorated vessels have been present at the Cannerberg site, and (100/95)*564 = 595 coarse ware pots.

Table 8.1

<table>
<thead>
<tr>
<th>ss/SF</th>
<th>(decor) n(SF)</th>
<th>(coarse) n(SF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>104</td>
<td>127</td>
</tr>
<tr>
<td>2</td>
<td>83</td>
<td>82</td>
</tr>
<tr>
<td>3</td>
<td>49</td>
<td>78</td>
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<tr>
<td>4</td>
<td>30</td>
<td>51</td>
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<tr>
<td>5</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>26</td>
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<td>8</td>
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<td>10</td>
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<td>12</td>
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<td>29</td>
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<td>14</td>
<td>1</td>
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<td>0</td>
</tr>
<tr>
<td>total</td>
<td>1015</td>
<td>3298</td>
</tr>
<tr>
<td>ave(ss/SF)</td>
<td>3.2</td>
<td>5.8</td>
</tr>
</tbody>
</table>

5 Van de Velde 2008: Tables 8-2 and 8-3.
Table 8.2 shows that a quarter (26%) of the fine ware sherd families has eroded surfaces, against only one tenth (9%) of the coarse ware. At first sight, the latter figure seems too low though one reason might be that finely finished and polished pot surfaces suffer more from burial than do rough and coarse pots. This seems to be borne out by Table 8.3, where eroded sherds and smooth sherds have very similar profiles (the correlation between the two distributions $r = 0.98$). Moreover, among the coarse ware (i.e., sherds with relatively thick walls, and readily visible tempering), a substantial number (15%) has smoothed surfaces; for fine ware (generally thin walls, and no visible additives) the reverse is not the case: only 1% of the 308 fine ware SFs from this site have surfaces rougher than smooth. Thicknesses of the coarse sherds range between 3 and 15 mm and average 8.3 mm; corresponding figures for the fine ware are 2 and 10 mm, with a mean at 5.1 mm (cp. Table 8.3).

<table>
<thead>
<tr>
<th>finish</th>
<th>coarse ware</th>
<th>fine ware</th>
</tr>
</thead>
<tbody>
<tr>
<td>polished</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>smoothed</td>
<td>15%</td>
<td>72%</td>
</tr>
<tr>
<td>rough</td>
<td>44%</td>
<td>1%</td>
</tr>
<tr>
<td>coarse</td>
<td>32%</td>
<td>0%</td>
</tr>
<tr>
<td>eroded</td>
<td>9%</td>
<td>26%</td>
</tr>
<tr>
<td>total count SFs:</td>
<td>564</td>
<td>308</td>
</tr>
</tbody>
</table>

Regarding the function of the pottery, the shapes of the vessels cannot generally be reconstructed from the few sherds that survive per individual SF so nothing can be said on this ground. Moreover, even when complete LBK pots have been recovered (as in cemeteries) their forms are quite indistinctive, and the ware is mostly restricted to the fine, decorated category. In the next section, the tempering of the vessels from the excavation will be adduced as an approximation towards this end.

<table>
<thead>
<tr>
<th>thickness</th>
<th>polished</th>
<th>smooth</th>
<th>rough</th>
<th>coarse</th>
<th>erosion</th>
</tr>
</thead>
<tbody>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>3</td>
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<td>22</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>64</td>
<td>2</td>
<td>1</td>
<td>26</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>74</td>
<td>13</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>62</td>
<td>22</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>33</td>
<td>54</td>
<td>25</td>
<td>12</td>
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<td>27</td>
<td>49</td>
<td>36</td>
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<td>9</td>
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<td>39</td>
<td>42</td>
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<td>10</td>
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<td>33</td>
<td>7</td>
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<tr>
<td>11</td>
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<td>16</td>
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</table>
8.4 The Cannerberg pottery, its temper, and its functions

To get a grip on the original use of the earthenware, determination of the different kinds of temper with which the clay for the pots has been leavened provides an approximation as they affect different mechanical properties of the vessel walls, leaving clues to the pot’s intended general function. Thus, the ‘pellets’ --either remnants of the preparation process of the clay itself (from pounding the dried clay) or added crushed sherds (also known as ‘grog’) -- will have been included to increase the resistance to the thermal stress occasioned by exposition of the vessel to the heat of a kitchen fire. Sand (and silt, too) has the property of increasing the resistance to mechanical stress, thus prolonging the life of the pot built from clay tempered with it --suggestive of a storage function. Table 8.4 summarizes the data for the coarse ware from the Cannerberg LBK site --for instance: 165 SFs had grog/pellets as their main and silt as their secondary temper. The fine ware (314 SFs from originally 335 vessels, according to the simulation), built generally of well-sieved and homogeneous clay which often included silt regularly found admixed in the bed, is not entered in the Table; because of its decoration (anciently much boosted by white or red incrustation) a service function as table ware seems a fairly safe deduction. Thus, those 451 (475, reconstructed) pots mainly tempered with pellets may have been built with an eye on their future use in cooking, and the 115 (original count probably 121) vessels with sand or silt in their make-up were destined to a storage function. With 29 households on the Cannerberg, each had altogether on the average 4 storage pots, 16 cooking vessels, and 11 or 12 pieces of table ware at their disposal that they had to make do with for the 15 or 20 years that their house stood --considering listed breakage rates these figures seem viable (albeit not exuberant). In a horticulturalist milieu service ware is used 2 years on the average, cooking pots 3-5 years, and storage containers 5 or more years. By comparison with, e.g., the older LBK site of Geleen-Janskamperveld, the Cannerberg households are rather poorly equipped, as in the former village a household had on the average 32 coarse and 27 fine ware pots at its disposal, almost 60% more. If the Cannerberg ceramic inventories are comparatively small, nothing can be said of additional, non-ceramic containers, such as baskets, bags and/or boxes of wood, wickerwork, leather or rope, which regularly do turn up in wet, more favourable contexts such as wells.

Table 8.4
Main classes of tempering for coarse ware. Rows: main tempering; columns: secondary additions.

<table>
<thead>
<tr>
<th></th>
<th>none</th>
<th>silt</th>
<th>pellets</th>
<th>sand</th>
<th>chalk</th>
<th>organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>3</td>
<td>6</td>
<td>165</td>
<td>41</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>silt</td>
<td>47</td>
<td>4</td>
<td>245</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>pellets</td>
<td>1</td>
<td>1</td>
<td>35</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>sand</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Projecting these counts on the past LBK village as done above, by the presumption of representativity these pots are to be distributed evenly over time and space/households, i.e., every household obtains 1/29th part of the pottery (and, by implication of other, non-ceramic items as well). That is: every household had 16 cooking, 4 storage and 12 table pots, summed over the years an average house existed, as above. Together, the Sherd Families vary considerably in size: fine ware SFs range from 1 to 260 cm², coarse pots have left surfaces of from 2 to 1200 cm². Nevertheless,

6 Orton et al. 1993: 221; Shepard 1954: 27; Sinopoli 1991: 15, 84.
8 Van de Velde 2007: 120.
9 Implicit here, the lengths of the house cycles (“house generations”) at both settlements are set equal; which asks clearly for further research.
both distributions peak at 20 cm² per SF. To give an idea: a run-of-the-mill decorated LBK pot has a surface area of some 950 cm², its coarse ware counterpart about 2200 cm² (computed for pots from Elsloo in features 332 and 140). That is, with average surface areas per SF of respectively 22 cm² and 65 cm², slightly less than 3% of the original surface area has been recovered.

Not systematically observed in the Cannerberg finds, the traces of wiping the still wet surfaces (both on the inside and the outside of the pots) are the only occasionally visible indications of the vessels’ coming into being; strip-like outlines of the sherds as sometimes reported do not occur in the present material. The way the pots have been assembled can only generally be indicated by pointing to the replication studies by Gomart.11

8.5 Pots for the archaeologist: a ceramic chronology

Being handmade and hand decorated, no LBK decorations are ever identical, although similarities do occur. It has been assumed (and I shall stick to it) that the fine ware served as table ware, and as such it has been visible to passers-by. Thus, the decoration will have been according to a standard, a canon or a common ‘language’, readily ‘intelligible’ for and shared by the people involved. Standards change with time, though, as does language or any other canon. Importantly, large deviations from a canon are not understood, they are not accepted or even will be punished. Changes (“innovations”) happen slowly; in any community there are people more open to change than the others, and they may initiate standards for the future. Gradually a larger part of the community will get accustomed to such a small change, which thus tends to a new standard, leaving laggards behind. That way, changes will gradually transform any social construct, among which pottery decoration. This is the basis for archaeological relative dating: given a set of decorated pots, these can be ordered chronologically on the basis of the gradual changes in their outlook; LBK pottery decoration being no exception in this regard. Thus, sometime in the development of this culture single-dented spatulae are replaced by twin- and shortly after by multidented spatulae as instruments of decoration; beginning at a different point in time pot necks get decorated, ever more intricately; again, empty decoration strips on the pot bellies get filled first (with small pointlets, or with hatchings), later with bounded interruptions (with in between stab-and-drag fillings). These and some more changes are the basis for relative dating of the pots, and with them, of the features they are found in, and even of the houses they are associated with. Quantifying these changes, a relative (ceramic) chronology can be calculated via one or another multivariate statistical procedure such as Correspondence Analysis or Principal Components Analysis. Generally, the range of outcomes is arbitrarily divided into equal segments, this because the rates of change on the different variables are unknown. An analysis of all of the pottery from many LBK sites in Limburg together ended with a general description of these changes throughout 20 ‘pottery phases’.13

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10 Modderman 1970.
11 e.g., Gomart 2014.
12 Rogers 1962.
13 Van de Velde 2012 describes the background, methodology, method, sampling and construction of this reference set.
By comparing the numerical outcomes of a similar analysis to the likely construction phases of the houses at the Langweiler-8 settlement archaeologists from the University of Cologne have sought to define phases equal to “House Generations”. It appeared that about 15 numerical segments or intervals would describe the shifts in the locations of the houses at that settlement\(^\text{14}\). Then this outcome was turned around: presently the chronology of German LBK settlements are analysed in terms of House Generations. On Dutch sites the (re)construction of house generations has proved impossible as yet: there are too many houses too close to one another in all settlements excavated thus far, and so an analysis in terms of the shifting of the yards is not feasible. The Cannerberg site, with its 29 houses/farmsteads fairly dispersed without much overlap, may be the first in the Netherlands to allow an analysis similar to the Langweiler-8 report.

A first statistical analysis\(^\text{15}\) of the ceramic contents of the 107 excavated LBK features on the Cannerberg, by-passing one find in phase 6, puts the six oldest finds in ceramic phase 9 of the Limburg-LBK sequence\(^\text{16}\), i.e., probably right at the beginning of LBK-2a in the customary Modderman scheme (Figure 8.2). The other features date mainly to ceramic phases 11 to 16, with the highest numbers in phases 12 and 16, and still 8 features dating to the final phase 20.

Still not really understood in their background and function\(^\text{17}\), the four “Limburger” vessel fragments from this excavation do not derive from house contexts but rather from relatively isolated contexts. The two largest come from a feature (S 335) dated to Phase 15; they are marked by their crushed bone tempers; one is not decorated, the other, largest one (165 cm\(^2\)) shows the characteristic fish-bone motif. Three small sherds of an undecorated pot found in feature S 1358 can be attributed to phase 20.

\(^{14}\) Stehli 1988.

\(^{15}\) Principal Components Analysis of the correlation matrix; 10 variables (single-, multidented spatula; lines, pointlets and hatchings on pot bellies; no, single and multiple bands in neck; lines, pointlets in neck decoration); first component covering 32.7% of variance being interpretable as chronological factor; 107 cases.

\(^{16}\) cp. Van de Velde 2012.

\(^{17}\) Vanmontfort et al., eds., 2010; Gomart 2014, 320.
The fourth SF, from S 1234, measures a meagre 8 cm² only; it was not accompanied by other pottery and could therefore not be dated.

Not unexpectedly, the distribution of the houses shows a similar chronological pattern as the features (Table 8.5). The major difference between the two distributions being the comparatively accentuated presence of houses in the final two phases. The three oldest houses in this scheme (nrs 26, 24, and 2) are accompanied by relatively few sherds, causing unreliable outcomes -- the best one can say of these houses is that they are "comparatively early" in the Cannerberg sequence.

Theoretically, given that the division of the full LBK-sequence in the Netherlands into 20 ceramic phases (as employed here) equates with 15 House Generations (as understood in Germany), the approximately ten ceramic phases of the Cannerberg settlement should bring out (multiples of) seven successive house constructions. The number of excavated houses on this site being 29 (16 with sufficient numbers of sherds, 6 with few sherds each, and the remainder without ceramics) is therefore suggestive of four yards. And indeed, the site plan can provisionally be divided into four such spaces: the northern and southern yards are quite clearly visible; the two centrally situated yards cannot easily be separated at first sight, but the number of houses there (counting 16 in the excavation) is nevertheless suggestive of two such areas, obviously partially overlapping one another (see the analysis presented at §7.7.1).

8.6 The houses and the pots

This paragraph provides a short, generalized description of the ceramics accompanying the LBK houses at the Cannerberg site.

House nr 1
This house is accompanied by features S 226, S 2092 and S 2093. Feature S 226 contains 6 decorated and 4 coarse ware SFs; S 2092 contains 2 decorated and one coarse ware pots; S 2093 contains 3 decorated and 4 coarse ware SFs. The decoration on the 11 pots (29 sherds) from the three features suggest ceramic dates in phases 10, 15 and 13, respectively -- together indicative of phase 13. The decoration's motifs are structured severally 1, -, - C (or curvilinearly) and 0, -, - R (rectilinearly) // jointly 1C0R.

House nr 2
This house is accompanied by the following features: S 2113, containing 1 decorated and 3 coarse ware SFs; S 2175, containing only one coarse SF; and S 2194 and S 2195, containing 2 coarse SFs each. The pottery phase suggested by the only decorated pot (1 sherd) accompanying this house, is phase 12 -- which is hardly better than an estimate. Structures of the decorations' motifs were not legible.

House nr 3
This house is accompanied by S 500, with 8 decorated and 12 coarse ware SFs; and S 653 with the sherds of one single coarse ware pot. The decoration on the 8 pots (45 sherds) points fairly clearly to ceramic phase 17. Structures of the decorations' motifs: oC5R.

18 Here, "yard" is the translation of the German (LBK-)word "Hofplatz", the contiguous area in which socially successive farmhouses have been built. It was an LBK custom to build a new house in the vicinity of the old one.
House nr 4
House nr 4 is accompanied by the following features: S 702, which contains 4 decorated and 6 coarse ware SFs; S 710, which produced sherds of 6 decorated and 3 coarse ware pots; S 1964, which yielded 5 decorated and 6 coarse SFs; S 1976, which contributed 5 decorated SFs plus 9 coarse ware vessels; and S 1979, which held one coarse ware SF. The pottery phases suggested by the decoration on these 20 pots (40 sherds) are 13, 12, 12, and 14: phase 13, 50. Recognizable structures of the decorations’ motifs are resp. 1, 4, 1 C; 0, 1, 1 R// 6C2R.

House nr 5 (in earlier descriptions House 4?)
This house is accompanied by the following features: S 700, which contains 13 decorated and 27 coarse ware SFs; S 709 and S 711, which yielded several sherds of one coarse ware pot each; and S 1980, which held 22 decorated SFs and 10 coarse SFs. The pottery phases suggested by the decoration on the 35 pots (80 sherds) come down to phases 13 and 12. Structures of the decorations’ motifs: 4, 2 C, 3; 11 R// 6C11R.

House nr 6
This house is accompanied by feature nr S 1933, which contains one decorated SF; S 1945, which held 2 SFs of either kind; and S 1958, which held one decorated SF. The pottery phases suggested by the decoration on the 4 pots (10 sherds) are resp. 11, 13, and 12; “summing” to phase 12. Structures of the decorations’ motifs: 1, 1, 0 C; 0, 1, 1 R// 2C2R.

House nr 7
This house is accompanied by feature nr S 598, which contains one decorated and 3 coarse ware SFs. The pottery decoration on the single pot (4 sherds) is suggestive only of ceramic phase 18. Structures of the decorations’ motifs could not be established.

House nr 8
This house is accompanied by feature nr S 753, which contains one decorated and 6 coarse ware SFs; S 754, with 2 decorated SFs and 11 coarse ones; S 774, with 4 coarse ware SFs; S 775, with 4 decorated and 8 coarse ware SFs; and S 2054, with 2 decorated SFs. The occupation phases of this house, as suggested by the decoration on the 9 pots (19 sherds), are phases 13, 14, 13, and 9, which would put this structure’s occupation in or around phase 13. Structures of the decorations’ motifs: -, 0, 2, 0 C; -, 1, 2, 1 R// 2C4R.

House nr 9
There being neither decorated pots nor even coarse ware accompanying this house, its chronological position has to be inferred by other means.

House nr 10
This house is accompanied by feature nr S 152, with sherds of one decorated pot, and S 160 with one coarse ware SF. The phase suggested by the decoration on this lonely pot (1 sherd only) is phase 20 --which probably is no better than a mere suggestion. No structures of the decorations’ motifs could be established.

House nr 11
This house is accompanied by feature nr S 192, with sherds of one decorated pot, and S 160 with one coarse ware SF. The phase suggested by the decoration on this lonely pot (1 sherd only) is phase 20 --which probably is no better than a mere suggestion. No structures of the decorations’ motifs could be established.
House nr 12
Feature nr S 46.27 accompanies this house; it contains 3 decorated, and 10 coarse ware SFs; also associated with this house are features S 45 with one, resp. 5 SFs; S 122, with only one coarse ware SF; S 123, counting one decorated and one coarse ware SF; S 140, containing 5 and 9 SFs, respectively; and S 150 with the sherds of one decorated pot. The pottery phases suggested by the decoration on the 11 pots (19 sherds) are 16, 16, 16, 17, and 16: an occupation in the 16th ceramic phase is clearly indicated. Structures of the decorations’ motifs: -, -, 1, 0, 1 C; -, -, 0, 3, 0 R// 2C3R.

House nr 13
This house is accompanied by feature nr S 807, which contains 3 decorated SFs and sherds from 3 coarse ware SFs; and S 815, which adds another coarse SF. The pottery phase suggested by the decoration on the 3 pots (21 sherds) is phase 20, right at the end of the sequence. Structures of the decorations’ motifs: 3CoR.

House nr 14
Feature nr S 983, which contains 10 decorated, and 19 coarse ware SFs, is associated with this house. The decoration on these 10 pots (19 sherds) suggests quite convincingly ceramic phase 19. Structures of the decorations: 2C3R.

House nr 15
Only one coarse ware SF has been found near this house, in feature nr S 1414. There being no decorated pots accompanying this house, its chronological position has to be inferred by other means.

House nr 16
This house is accompanied by feature nr S 1367, with one decorated, and one coarse ware SF; and also by S 1411 holding 4 decorated and 6 coarse SFs; by S 2780 with 2 and one SFs, respectively; and one single coarse vessel in S 2301. The pottery phases suggested by the decoration on the 7 pots (14 sherds) 15, 16, and 14: probably summing to 16, so. Legible structures of the decorations’ motifs: 0, 0, 0 C; 1, 1, 1 R// 0C3R.

House nr 17
House 17 is accompanied by feature nr S 22.04, which contains one decorated and 6 coarse ware SFs; additionally, S 1202 comes with one coarse ware SF. The pottery phase suggested by the decoration on that single pot (2 sherds) is ceramic phase 15, which obviously is no better than a guess. Structures of the decorations’ motifs could not be established.

House nr 18
House 18 is associated with feature nr S 12.13, which contains 3 coarse ware SFs; and also with S 2454, which yielded 3 decorated SFs, as well as 5 coarse ones. The pottery phase suggested by the decoration on the 3 pots (10 sherds) is the final phase 20. Structures of the motifs: 1CoR.

House nr 19
This house is accompanied by feature nr S 21.01, which contained one decorated and 5 coarse ware SFs; also, S 2363, which held sherds of one decorated and 2 coarse ware SFs; S 2304 came with 3 decorated and 6 coarse ware SFs; S 2312 with one decorated and 4 coarse SFs; and finally, S 2494 contained 2 decorated and one coarse SFs. The
pottery phases suggested by the decoration on the 8 pots (21 sherds) are, per feature, ceramic phases 11, 13, 20, 16 and 16 --a fairly wide spread, based on small numbers. Motif structures of the decorations: 0, 1, 1, - , - C; 1, 0, 0, - , - R// 2C1R.

House nr 20
Feature nr S 948, which contains 4 decorated, against 16 coarse ware SFs; and nr S 2302 holding one decorated and 2 coarse SFs are associated with this house. The pottery phases suggested by the decoration on the 5 pots (33 sherds) are 14 and 11; possibly "summing" to ceramic phase 13. Structures of the decorations' motifs: 2, 1 C; 0, 0 R// 3CoR.

House nr 21
With no decorated pots along this house, its chronological position has to be inferred by other means.

House nr 22
This house is accompanied by feature nr S 2039, which contains 6 decorated and 6 coarse ware SFs; S 2043 counts 2 decorated SFs, as well as 2 coarse ware ones; and S 2046 has one coarse ware SF. The pottery phase suggested by the decoration on the 8 pots (37 sherds) is phase 12. Structures of the decorations' motifs 0, 0 C; 2, 1 R// 0C3R.

House nr 23
House 23 is only grouped with feature nr S 640, which contains 3 decorated and 5 coarse ware SFs. The pottery phase suggested by the decoration on the 3 pots (4 sherds) is ceramic phase 16. Structures of the motifs on the vessels were illegible.

House nr 24
House 24 is associated with feature nr S 2061, from which one decorated and 4 coarse ware SFs have been secured. The pottery phase suggested by the decoration on this pot (2 sherds) is phase 10, based on one pot only and hardly reliable so. It was not possible to determine the structures of the decoration's motifs.

House nr 25
Associated with this house is feature nr S 1939, which contained 6 decorated and 3 coarse ware SFs; S 1940, which held 10 decorated and 4 coarse ware SFs; also, S 1942, which yielded 4 decorated and 5 coarse ware SFs; S 1975, with 2 decorated and one coarse SFs; and finally S 1982 and S 1983, which both contained sherds of one coarse ware SF each. The pottery phases suggested by the decoration on the 22 pots (80 sherds) are respectively 15, 14, 16, and 14 --say, phase 15. Structures of the decorations' motifs: 0, 3, 2, 1 C; 2, 4, 2, 1 R// 6C9R.

House nr 26
This house is accompanied by feature nr S 369 with 2 decorated and one coarse ware SF, and also feature S 516, which had one single decorated sherd. The pottery phases suggested by the decoration on the 3 pots (5 sherds) are phase 9. Structures of the decorations' motifs could not be established for any of the pots.

House nr 27
There being no decorated pots associated with this house, its chronological position has to be inferred by other means.
House nr 28

Without decorated pots the chronological position of this house has to be inferred by other means.

House nr 29

House 29 is accompanied by feature nr S 2169, which contains one coarse ware SF; and feature nr S 2180 holding 2 decorated SFs and 3 coarse ware pots. The pottery phase suggested by the decoration on the 2 pots (7 sherds) is ceramic phase 12. Structures of the decorations' motifs are 0C1R.

8.7 Some examples of the Cannerberg LBK pottery

In line with the egalitarian impression of the quite similar plans of the houses at the Cannerberg site, the pottery excavated in that settlement is quite unspectacular. Nevertheless, I shall present a few examples just to give an impression.

But preliminary to a short presentation of this excavation's glitters, a few words on the terminology.

When describing a corpus of data the terminology should be clear, unequivocal and consistently employed. Here, LBK pottery decoration is analysed at several, independent levels, each with its own labels. The tool with which the incisions have been made when decorating the still wet surface of the pots was a pointed tool: it was drawn not pushed across the surface. Bandkeramians employed such tools with initially only one single, not too sharp a point --most incisions have a U-shaped cross section (though V-shapes, from sharp tools also occur). Later in time they started to use two-pronged pointed tools, soon followed by multiple-prongs: I have seen decorations made by eight points of a single such instrument. Following suggestions by Shepard, in the present text 'pointed tool' refers to the older type, whereas 'two-', 'three-' and 'multiprongs' will refer to the later types.

The components that make up the decoration are: (1) lines drawn with a sharp tool; (2) pointlets, points or punches, i.e., smaller, medium and larger ever referring to this body of data; (3) hatches which are shallow, often parallel lines; and (4) sliding (or rocking) pointlets (an awkward translation of German *Furchenstich*), whereby successive pointlets are impressed in a line in the clay without fully lifting the tool. Especially the fourth component has been popular in the pot decoration in the later half of the NW-LBK; it was applied with single pointed tools as well as with multiprongs.

Then, at a higher level, decoration on LBK pottery falls apart into two categories: it is either rectilinearly or curvilinearly executed, the two never occurring together on the same pot (I know of only one LBK vessel with both categories; it was found in the Flomborn cemetery). Apart from the curvi-/rectilinear dichotomy, one other, important opposition is found in the decoration: the wave and the spiral motifs. Again never going together; they have been drawn either in rectilinear or curvilinear shape: zigzags and meanders when rectilinear, waves and spirals if curvilinear.

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19 Shepard 1954, 199-201.
20 Van de Velde 1979b.
8.7.1 Turning to the Cannerberg pottery

The earliest traces of habitation on the Caberg point to the 9th and 10th ceramic phases, roughly coeval with the turn from the Middle to the Younger LBK (in the Dutch system LBK-1d to LBK-2a; or LBK-II to LBK-III, in the Meier Arendt scheme); substantial occupation of the site is attested between the ceramic phases 11 and 17 (LBK-2a to -2c), after which the number of recognisable finds gradually peters out, to end in the 20th ceramic phase (i.e. simultaneous with the end of the LBK occupation in the area between Cologne and Brussels.) The Cannerberg houses are being occupied right into this final phase.

Photographs of decorated ceramics from the 12th phase (Figure 8.3, Figure 8.4 and Figure 8.5) are illustrative of the rapid evolution of the decoration on the turn from the Middle to the Younger LBK: while earlier pots exhibit outlines of motifs with hardly or no fillings, decoration from phase 11 on fills the spaces within the outlines of the strips.\(^22\)

Quite representative of the pottery decoration from this phase, sherds from sherd family (or ‘SF’) 221 are shown in Figure 8.3; they derive from feature S 1980, which is situated on House plot 4. Part of the pot-belly decoration is visible on the left-most sherd, two lines delimiting a strip filled with a double row of small punches. Two rows of pointlets, drawn by a pointed tool not completely lifted from the pot’s surface, make up the rim decoration. Among the 23 pots from this feature, 20 have been decorated with a (single-) pointed tool and another three by a multiprong. Among six recovered rims, four carry a single row of punches, two have twin rows on them; one of the latter is shown in the figure.

\(22\) Van de Velde 2012.
Another group of sherds (SF-573) is attributed to this same phase 12 and shown in Figure 8.4. It is accompanied by five more decorated pots from feature 5 710, as the previous set also associated with the House 4 yard. The decoration is rather more complicated than on the previous vessel: the junction of two curved strips filled with punches drawn by a simple rocker tool; the strips are “kept together” by a cross band. Below the latter two larger points are visible which primarily served to neatly parcel out the pot’s surface before the main motifs were applied; the divisory signs have been included in the decoration. Important from a chronological point of view is the execution of the strip fillings by means of a rocking tool with only a single point: in later phases this way of filling the strips is applied to the vast majority of pots, but then with multi-toothed prongs.
The next illustration shows several sherds of sherd family 436 (found together with five other decorated families in feature S 2039 on House plot 22) (Figure 8.5). The dark-brown colour of the sherds is not uncommon, although the majority of thin-walled LBK-pottery has dark grey or even black appearances. Rather more uncommon though not really exceptional is that the decoration apparently covers the full surface of the pot (but for the pot's bottom: LBK vessels' bottoms were left undecorated). The pot's rim has a simple, uninterrupted double row of pointlets all around the vessel. The belly decoration consists of rectangularily executed “spirals”: straight line segments have been drawn in quite narrow, concentric windings, and the space between the lines is filled with punches, in single rows. The triangular spaces between these straight-lined spirals have been filled with a similar design of ever smaller triangles: parallel lines with a row of punches in between. There, directly below the rim decoration, on the smaller sherd a larger punch is visible, one of those partitioning the pot's surface ahead of the decoration. The rectilinear spiral/meander main motif is pan-LBK, its execution reminds of (contemporaneous) Early Stroke Ware, found hundreds of kilometres to the southeast. According to our statistical analysis the decorated pots in this feature have been made in ceramic phase 12.

Statistically somewhat later, because assigned to pottery phase 13, the sherds of SF 326 from feature S 700 (Figure 8.6) are reminiscent of SF-573 above (Figure 8.4). They are dated younger because of the larger number of punches/pointlets filling the strips of the decoration of this vessel, here in five rows. Apart from their curvilinearity, nothing much can be said of the decoration's motifs, although the second sherd from the left might suggest the end of a spiral --one of the two motifs (exclusively) employed by the Bandkeramik potters. Twelve more sherd families compose the decorated inventory of this feature, as yet the only one that can be associated with House yard 5.

23 Link 2012b; Lönne 2003.
Figure 8.7
Pottery from feature 1780 (findnumber 819).
Scale 1:1.

Figure 8.8
Pottery from feature 335 (findnumber 149).
Scale 1:1.
Very much eroded, the sherds of sherd family 173 from feature S 1780 on House 16’s yard, should be representing the next, 14th ceramic phase (Figure 8.7). Although the skin of the sherds has disappeared, the regular arrangement as well as the shape of the punches betray a rocking filling (generally known as Furchenstich) of the decorative strips by means of a prong with an unspecifiable number of teeth. The largest sherd also shows the delineation of the motif, in the right top angle. From the same yard feature S 1367 held one single decorated sherd family, by itself suggestive of ceramic phase 15.

Decoration on the five sherds still constituting SF 149 (from feature S 335, as yet not assigned to a house plot; Figure 8.8 is quite unrepresentative of the LBK canon, it rather belongs to the elusive Limburger pottery. The conspicuous white temper is hardly or not at all met with in true LBK pottery, especially not in their decorated ceramics; it consists of crumbs of chalk, perhaps meant as a substitute for the bone particles very popular in the pottery of the Limburger group. The applied strip (top of the largest sherd in the picture) is much more common in this ware than in regular Bandkeramik pottery, especially the herringbone incisions on it do not occur in the latter. Crossed incisions, best visible in the two top sherds in this picture, also belong to the regular repertory of this pottery group. Decorated LBK pottery (amounting to four SFs) from this same feature puts these Limburger sherds in the 15th ceramic phase.

Though having suffered some erosion, the single rim sherd remaining of this vessel belongs also to phase 15 (SF 36, from feature S 2210 which could not be assigned to any house’s yard; it contained the remains of 20 decorated vessels) (Figure 8.9).

\[24\] Modderman 1974; Gomart 2014; Vanmontfort et al. 2010.

Attracting most attention is the filling of the decoration’s incisions, which presents a false impression, though: now filled with loess, it was originally with either (white) bone paste or (red) ochre pulver. The pot’s top shows four lines parallel to the rim, as such indicative of a fairly late phase in the chronology. Probably this neck decoration was meant as a continuous strip, but it is interrupted or rather clumsily started at a non-canonical place: had there been any structural interruptions, these would have occurred just opposite the tops and/or the joints of the main motifs. The main motif cannot be determined decisively: both a wave and a spiral (rectilinearly executed) would fit the sherd as it is. Vaguely visible is a secondary motif consisting of a vertical row of punches (perhaps part of a double row) in the saddle of the main motif and in itself the elaboration of divisory marks. Generally, the incisions filling the strips may have been applied by a prong with four teeth, after the rim had been decorated and the contours of the main motif drawn in the pot’s surface. Because of the loess infill it is unclear whether rocking or straight drawing was intended, or perhaps hatching imitated, hatched decoration being not uncommon in this phase of the LBK’s pottery repertory.

Much more interesting than even the Limburger pottery is this sherd of a thick-walled/undecorated vessel, which --apart from a hole anciently serving to repair a crack-- shows a strap inside the rim to rest a lid upon, rather unique in Bandkeramik ceramics.

Figure 8.11
Pottery from feature 500 (findnumber 628). Scale 1:1.

Figure 8.12
Pottery from feature 500 (findnumber 619). Scale 1:2.
The two accompanying decorated pot remains point to an origin in ceramic phase 16.

Eight sherd families of decorated ware and the remains of eleven thick-walled vessels accompany the two finger decorated sherds of SF 353 dated to ceramic phase 17 (feature S 500 on the House 3 plot; Figure 8.11). What makes them exceptional is the occurrence of several rows of finger pinches next to one another, where these normally are seen in single or twin series at the most.

Deriving from that same feature, yard and ceramic phase 17 is the set of sherds from sherd family 362 which nearly allows full reconstruction of the original vessel. Even when the bottom cannot be determined unequivocally, the chronology would suggest a spherical fond (Figure 8.12). Sparse white specks indicate an original filling of the incisions with bone paste. The decoration is not very consistent, even flimsy in parts. Consider the rim decoration: the top row has visibly been made with a double prong, as seen especially in the centre of that row; the twinning apparently unintended. The second row from top shows quite irregular spacing of the punches, but no sign of twin points. Then the vessel’s surface has been subdivided by sets of either three or two quite substantial punches. The main motif, a rectilinear wave, has been constructed with three (central part) or four (lower left) rows of obliquely impressed punches, in parts without raising the tool from the pot’s surface (central part.) Again, incidentally the second tooth of the tool has left traces, too (bottom row in the centre of the photograph.)

Another sherd family allows complete reconstruction of the vessel, even of its bottom (SF 55, from feature S 500 on the House 3 yard; Figure 8.13). As above, the decorated sherd families accompanying the present one in this feature together yield a date in ceramic phase 17. Rather uncommon on Dutch LBK pottery is the cross hatched infill of the strips. The rim decoration consists of two rows of nearly perpendicular punch impressions by a tool with a relatively long straight edge, almost a spatula. When the belly zone underneath had been subdivided a rectilinear wave strip was incised, which was then filled in with cross hatchings. The original subdividing punches were cleared and replaced by secondary motifs built up as single, vertical rows of horizontal punches. Interesting is the visible tempering of this pot’s clay with sand, which is only rarely observed in decorated LBK (table) ware, and suggestive of an experiment to prolong the vessel’s life and serviceability.
Pitily eroded, its surface completely gone (and with it also about half the body), is a beautifully shaped little pot built in the twentieth and final ceramic phase of the Dutch LBK sequence (Figure 8.14). In the present file it is identified as sherd family 554, the only decorated one recovered from feature S 1494, which cannot be associated with any specific house yard. A hole drilled through the largest sherd testifies to prehistoric care and mindfulness. The rim decoration of two rows of punches, a little less than regularly spaced, has probably been made with a tool with a simple tip. The main decoration consists of a sequence of (originally four) rectilinear waves or zigzags around the pots belly, drawn as a strip bordered by two parallel line incisions and filled with regularly spaced punches, maybe applied by a prong with three dents --but because of the erosion this can no longer be ascertained. The subdividing marks have been replaced by vertical rows of each four fat punches underneath the vertices and atop the junctions of the motif strip.

Interesting from a technological point of view, two fairly small sherds serve to illustrate one of the ways in which LBK potters built their vessels (Figure 8.15). These sherds were found in the yard of House 4 in feature S 1964, accompanied by a.o. five decorated sherd families that assign them to ceramic phase 12. More often than not, and having no knowledge of the potter’s wheel, Bandkeramik potters set flattened clay ribbons on top of one another, and then smeared the joints. If carefully done, this construction will hold almost as well as the more recent building method on the wheel. A token of the care with which LBK women produced their vessels is that these joints very rarely turn up in excavations: most of the time cracks and sherd edges do not coincide with these potentially weak points.

Above, in the preceding examples of LBK pottery, several repair holes have been mentioned as they came by in the photographs. The present picture (Figure 8.16) has expressly been made to show such a hole. Being drilled from the outside of the vessel it is conical, the size of the hole being larger on the outside of the pot than on its inside. Not available to us is the opposing part of the vessel which had a similar hole. Both holes were drilled by means of a flint borer at less than a centimetre from the crack to be repaired, and then the parts tied together by means of fibers and sealed with wax or clay. This finishing is known from pots excavated from water wells, and given the frequency of pierced sherds in all LBK excavations, they, LBK people, were not inclined to easily throwing away their things.

26 cf. Gomart 2014 for LBK alternatives to the construction here.
The LBK flint material from the Cannerberg

9.1 Introduction

Flint is the most abundant find category at the Cannerberg site. Over 30,000 artefacts have been retrieved, which predominantly can be associated with the Bandkeramik habitation. Most flints came from different types of pits that were situated in the Bandkeramik settlement. To a minor extent Bandkeramik posthole features produced material, whereas a small portion was collected from the topsoil when descending with the mechanical shovel. An additional but minor part has been found in the Iron Age features.

Generally Bandkeramik settlement sites in the southern Netherlands and eastern Belgium produce rich flint assemblages signifying that this fine grained cryptocrystalline quartz rock played an important role within the local Bandkeramik communities.\(^1\) This richness can for a great part be attributed to the nearby presence of different natural flint occurrences, making this region an important provider for flint in surrounding regions, such as western Germany.\(^2\) When compared to many settlements on the Graetheide plateau, the Cannerberg site, however, even stands out more due to its very high quantity of material.\(^3\) This abundance is for a great part caused by the presence of three pits that produced more than 50% of all the Bandkeramik flint.

9.2 Methodology of the analysis

The enormous quantity of the material as well as time and budget constraints did not allow for an individual analysis of all artefacts but forced us to make choices and focus on certain aspects of the flint assemblage. Due to the unique richness of the Bandkeramik component of the Cannerberg site it was decided to entirely devote our time to this complex. Not only the wealth of the Early Neolithic material, but also the relatively poor composition and the many uncertainties that surround the Iron Age complex can be held as deciding factors. First of all, the latter complex includes a lot of un-worked and often burnt material. Secondly, the remainder mainly consisted of artefacts that typologically can be considered Bandkeramik in age. Whether these artefacts unintentionally ended up in the features or whether they had deliberately been re-used by the Iron Age community could not be sufficiently determined by macroscopic analysis alone and also required time consuming microscopic use-wear analysis. Due to the uncertain outcome and limited time available it was decided to not pursue this latter research line.

Regarding the Bandkeramik flint material it was decided to focus on raw material use and reduction stage, rather than carefully reconstructing the technology that was employed in working the material. The main research questions can be summarized as follows:

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What flint varieties did the Cannerberg community acquire? In what form did this material enter the site? To what extent did they locally reduce material and for what purpose? How do the complexes from the pits rich in flint compare to the contents of the many Long pits associated with the house structures? What does this mean in terms of a functional arrangement within the site? To what extent is it possible to discern changes in flint use and spatial arrangement through time?

To provide answers to these questions, we adopted the methodology that Marjorie de Grooth has used in her analysis of a number of Bandkeramik settlement sites on the Graetheide plateau and on the Caberg.\footnote{De Grooth 2007; 2014.} In this methodology the content of a single feature is taken as a whole and within each feature flint artefacts are grouped according to flint variety and artefact type. The distinguished artefacts types are listed in Table 9.1. For each group of artefacts belonging to the same type a distinction was made between artefacts possessing no cortex, 1-85% cortex, or more than 85% cortex. Furthermore, flakes and blades were subdivided according to completeness of the fragments. Tools have been subdivided in the types listed in Table 9.1. Size measurements were taken for the complete sides of each tool. The number of artefacts and the total weight was determined per group.

Time and budget did not allow describing all the collected Bandkeramik material. It was therefore decided to focus on features and larger contexts (house sites) that produced reasonable quantities of material (N>30). Preferably these features had to be sectioned and fully excavated. Furthermore a focus was put on features that could be attributed to house plans or that had been part of specific pit clusters. In total material from 61 features has been analysed, of which 39 features were chosen on the basis of rich artefact contents (N>30); the other 22 were selected due to their association with any of the identified houses.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>Tool type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flake</td>
<td>End-scraper</td>
</tr>
<tr>
<td>Flake tool</td>
<td>Side-scraper</td>
</tr>
<tr>
<td>Blade</td>
<td>Scraper (other)</td>
</tr>
<tr>
<td>Blade tool</td>
<td>Drill</td>
</tr>
<tr>
<td>Tool (unspecified blank)</td>
<td>Burin</td>
</tr>
<tr>
<td>Angular debris</td>
<td>Pointed blade</td>
</tr>
<tr>
<td>Waste (flat debris)</td>
<td>Pic</td>
</tr>
<tr>
<td>Chip (&lt;15 mm)</td>
<td>Notched piece</td>
</tr>
<tr>
<td>Core preparation blade</td>
<td>Dented piece</td>
</tr>
<tr>
<td>Core re-juvenation flake: tablet</td>
<td>Truncated piece</td>
</tr>
<tr>
<td>Core re-juvenation flake: other</td>
<td>Arrow head</td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
<td>Quartier d’orange</td>
</tr>
<tr>
<td>Flake core</td>
<td>Combination tool</td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>Retouched</td>
</tr>
<tr>
<td>Blade core</td>
<td>Steeple retouched</td>
</tr>
<tr>
<td>Re-used blade core</td>
<td>Blanks with polish only</td>
</tr>
<tr>
<td>Unmodified material</td>
<td>Blanks with use retouche</td>
</tr>
<tr>
<td>Pebble fragment</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Undetermined</td>
<td></td>
</tr>
<tr>
<td>Undetermined due to burning</td>
<td></td>
</tr>
</tbody>
</table>

Table 9.1: Recorded artefact (left) and tool (right) types.
In total over 20,000 artefacts have been analysed following this methodology. Among these around 6,800 represent artefacts smaller than 1.5 cm, hereafter referred to as chips. These have not been further analysed on raw material type and presence of cortex. The assemblage is well preserved with only 1.5% of the artefacts possessing signs of post-depositional burning. The heavily burnt pieces have been grouped under the category "undetermined due to burning". Post-depositional patination has not occurred or was only minimally present. This leaves almost 12,000 artefacts categorized (Table 9.2).

### Table 9.2
Number and weight of artefacts by type.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>N</th>
<th>Weight (g)</th>
<th>%</th>
<th>W%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flake</td>
<td>7155</td>
<td>94784</td>
<td>36.54</td>
<td>38.77</td>
</tr>
<tr>
<td>Flake tool</td>
<td>165</td>
<td>5981</td>
<td>0.84</td>
<td>2.45</td>
</tr>
<tr>
<td>Blade</td>
<td>3292</td>
<td>17118</td>
<td>16.81</td>
<td>7.00</td>
</tr>
<tr>
<td>Blade tool</td>
<td>310</td>
<td>2613</td>
<td>1.58</td>
<td>1.07</td>
</tr>
<tr>
<td>Tool (unspecified blank)</td>
<td>5</td>
<td>80</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Angular debris</td>
<td>174</td>
<td>3014</td>
<td>0.89</td>
<td>1.23</td>
</tr>
<tr>
<td>Waste (flat debris)</td>
<td>986</td>
<td>2171</td>
<td>5.03</td>
<td>0.89</td>
</tr>
<tr>
<td>Chip</td>
<td>6683</td>
<td>933</td>
<td>34.13</td>
<td>0.38</td>
</tr>
<tr>
<td>Core preparation blade</td>
<td>19</td>
<td>246</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Core re-juvenation flake</td>
<td>152</td>
<td>18344</td>
<td>0.78</td>
<td>7.50</td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
<td>30</td>
<td>847</td>
<td>0.15</td>
<td>0.35</td>
</tr>
<tr>
<td>Flake core</td>
<td>95</td>
<td>38814</td>
<td>0.49</td>
<td>15.87</td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>26</td>
<td>6589</td>
<td>0.13</td>
<td>2.69</td>
</tr>
<tr>
<td>Blade core</td>
<td>81</td>
<td>41276</td>
<td>0.41</td>
<td>16.88</td>
</tr>
<tr>
<td>Re-used blade core</td>
<td>30</td>
<td>9671</td>
<td>0.15</td>
<td>3.96</td>
</tr>
<tr>
<td>Unmodified material</td>
<td>69</td>
<td>820</td>
<td>0.35</td>
<td>0.34</td>
</tr>
<tr>
<td>Pebble fragment</td>
<td>4</td>
<td>161</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Unspecified due to burning</td>
<td>307</td>
<td>1040</td>
<td>1.57</td>
<td>0.43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19583</strong></td>
<td><strong>244501</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

### 9.3 Raw materials

#### 9.3.1 Introduction

Distinguishing and identifying flint varieties used by the Bandkeramik communities have shown a great progress the past 10 years particularly due to the work of Marjorie de Grooth.\(^5\) It has become clear that Bandkeramik people inhabiting the Graetheide and Haspengouw plateaus used a number of flint varieties from different sources. In some cases these sources could be pinpointed to very localised outcrops, in other cases more general flint types can only be distinguished originating from multiple localities or outcrops within a micro-region.

De Grooth has identified the most frequently used flint type as originating from the Lanaye Limestone deposit, being the uppermost member of the Gulpen Formation.

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\(^5\) De Grooth 2011; 2014.
Due to different types of erosion Lanaye flint crops out at numerous places. For the Bandkeramik the most important natural occurrences are the eluvial flints from the Banholt – Rode Bos - Hoogbos localities as well as the Rullen – Sint-Pieters-Voeren localities. These represent very typical secondary flint occurrences, which were formed after the Lanaye limestone dissolved and the remaining flint nodules became incorporated in residual loams, resulting in very characteristic alterations related to chemical weathering processes in these soils.

In addition, Bandkeramik communities have used Lanaye gravel flints as well. These occur in the Meuse gravels and pinpointing extraction places is more difficult as they can be picked up at one of the numerous places where these gravels crop out.

Apart from Lanaye flint, some other flint types regularly turn up. The most important include Haspengouw (Hesbaye) and Valkenburg flint. The former originates from a Formation dating to the Campanien and can be found as rolled river gravels as well as eluvial flints in eastern Belgium sites. Valkenburg flint originates from the Emael and perhaps also the Schiepersberg Limestone, younger limestone members that are part of the Formation of Maastricht.

The Cannerberg community used a number of different flint varieties (Table 9.3). A significant portion can be pinpointed to one of the above mentioned localities or micro-regions. The most significant number of artefacts, however, is made from a Lanaye flint type that has thus far not been identified as a specific variety and for which its exact source locality remains unknown. Given the very high quantities of this flint variety at the Cannerberg site its source must be searched for in the nearby surroundings. Apart from this “local” Lanaye flint a number of other varieties were found that could not be classified to one of these above flints as well. In almost all cases these other flints must be eluvial varieties, based on their typical rough feeling yellow-brown cortex and varying discoloration of the flint itself towards more (dark) browner hues.

The different distinguished flint varieties will be presented separately in the following paragraphs.

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6 Felder & Bosch 2000.
7 De Grooth 2007; 2011; 2014.
9 De Grooth 2011; 2014.
<table>
<thead>
<tr>
<th>Flint variety</th>
<th>N</th>
<th>W</th>
<th>%</th>
<th>%W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanaye flint - local variety 1</td>
<td>10116</td>
<td>205866</td>
<td>78.4</td>
<td>84.5</td>
</tr>
<tr>
<td>Lanaye flint - local variety 2 (eluvial)</td>
<td>809</td>
<td>8821</td>
<td>6.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Haspengouw flint</td>
<td>245</td>
<td>2212</td>
<td>1.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Banholt flint (eluvial)</td>
<td>69</td>
<td>961</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Rullen flint other varieties (eluvial)</td>
<td>267</td>
<td>3290</td>
<td>2.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Rullen flint variety brown-grey (eluvial)</td>
<td>305</td>
<td>5108</td>
<td>2.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Rullen flint - grey variety (eluvial)</td>
<td>51</td>
<td>1382</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>Lanaye eluvial - light grey variety</td>
<td>92</td>
<td>2011</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Lanaye eluvial - brown variety</td>
<td>50</td>
<td>658</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Lanaye eluvial (unspecified)</td>
<td>135</td>
<td>3334</td>
<td>1.0</td>
<td>1.4</td>
</tr>
<tr>
<td>Lanaye unspecified - speckled grey variety</td>
<td>22</td>
<td>344</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Lanaye unspecified - grey-blue variety</td>
<td>54</td>
<td>360</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Lanaye unspecified</td>
<td>257</td>
<td>4635</td>
<td>2.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Wommersom quartzite</td>
<td>1</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Terrace flint (Lanaye)</td>
<td>15</td>
<td>1641</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Terrace flint (unspecified)</td>
<td>92</td>
<td>1795</td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Unspecified</td>
<td>23</td>
<td>239</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Unspecified due to burning</td>
<td>297</td>
<td>910</td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12900</strong></td>
<td><strong>243568</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

9.3.2 Lanaye Cannerberg variety 1 (LC1)

Given the enormous quantities of this material found at the site and the relatively large size of some of the artefacts, this flint variety is assumed to be locally obtained. Chapter 5.4 provides an outline of likely locations from where that might have occurred and this can be within a distance of several kilometres from the site. In short the flint represents a true Lanaye flint, which has undergone hardly any alterations in colour, grain size and translucency (Figure 9.1). In this respect it looks very similar to primary Lanaye flints that have been extracted from, for example, the Rijckholt quarry mine shafts, and it is different from typical eluvial varieties that display a change in colour towards (red) browner hues, as well as a partial change in translucency.\(^\text{10}\) Its cortex characteristics, however, differ from Bergenfrisch flints. It feels rough, but it can be very thin, almost like a very thin skin (mostly less than 1 mm), suggesting it has undergone significant dissolution (Figure 9.2). The rough feel indicates it has not been subjected to much mechanical erosion. Its colour is true white to slightly brown on the outside. One might distinguish the flint with the true white cortex from the flint with the more yellow brown cortex, as the difference in cortex types suggests difference in post-formational processes, the white being a flint without much iron-oxidation (so not buried in a soil) and the yellow brown a type that has undergone minor oxidation and might have been buried in a soil for a relatively short period. The flint itself does not exhibit any evidence of iron oxidation supporting the limited alteration. Do we combine these different aspects then the most likely source locality type would be slopes which cut through the Lanaye limestone and where relatively fresh flints have been eroded from the chalk and have become available for collecting.

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\(^{10}\) De Grooth 2007.
The flint itself displays the typical dark grey to light grey colour commonly found among Lanaye flint. De Grooth\(^\text{11}\) provides detailed description of the general characteristics of the Lanaye flint in primary context.

\(^{11}\) De Grooth 2007.

**Figure 9.1**
Three blade cores (a,b,c) and one large flake (d) clearly displaying the variation in colour and inclusions found within the LC 1 flint variety.
Different coloured zones can be discerned. Generally, parts directly underneath the cortex are darker in colour (see Figure 9.1c) than the core of the nodules, which sometimes can be as light as pale grey (see Figure 9.1a). Many pieces exhibit banding underneath the cortex (see Figure 9.1d). Especially among flint found in the Long pits, this variety has a true white cortex with a 3-5 mm thick dark grey homogeneous band underneath it, alternated with a lighter grey zone (see Figure 9.2b). Overall the flint has a fine grain size. Variation, however, exists with both the band underneath the cortex and the lighter coloured zone being slightly more fine-grained (see Figure 9.2b), whereas the lightest coloured inner zones being coarser and giving less regular conchoidal cleavage than the average flint (see Figure 9.1a).

The concentration and type of inclusions vary a lot. Generally speaking the flint has dark coloured small round to oval inclusions or specks. Especially in the lighter coloured zones these inclusions are easily noticed. It is not clear whether these specks are true inclusions or whether they represent more purely silicified parts. In addition to this, the flint type possesses many small white inclusions (either fossil fragments or poorly silicified parts still containing a lot of calcite). Occasionally these lighter coloured inclusions can measure up to almost 2 cm.
9.3.3 Cannerberg eluvial flint variety 2 (LC2)

This flint variety represents the second most occurring likely local flint type at the site. This variety probably is an eluvial flint. The cortex feels rough and has a slightly yellow brown colour (Figure 9.3b top left). Some pieces have been naturally cleaved giving them a patinated outer surface (Figure 9.3b lower row and fourth flake top row). These surfaces generally display a red-brown colour suggesting iron oxidation occurred.

The flint exhibits less colour variation than LC1. A dark brownish grey colour predominates (Figure 9.3a). This colour might grade into more dark grey or to more grey brown. The dark grey pieces are very difficult to discern from the dark grey equivalents of the LC1 variety. It clearly shows that the two flint varieties are both of the Lanaye flint type. The more brownish hues suggest that this likely is an eluvial type of flint, or a flint type that has undergone alteration which can be attributed to soil processes.

The available core types suggest that this flint was worked more exhaustively than LC1. Small cores predominate. The small and exhausted nature of the cores makes it difficult to see how flint colour varies within a piece. It seems that the flint is darker in the inner core and becomes lighter towards the outer rim.

A very typical feature of this flint relates to a high concentration of round to angular lighter coloured inclusions, likely fossil fragments or poorly silicified flint zones (see Figure 9.3a). Inclusions vary in size from <1mm to 20mm. Their concentrations vary a lot, from dense zones with almost 20% of inclusions to zones hardly containing any inclusions.
9.3.4 Banholt flint

This flint type represents one of the most common eluvial flint types within settlement sites on the Graetheide plateau.\textsuperscript{12} At Cannerberg its abundance is low. It is a Lanaye flint that can be found at extraction points of Banholt, Rode Bos, and Hoogbos. De Grooth provides an extensive description of its characteristics in her paper on the flint from the Geleen-Janskamperveld settlement site.\textsuperscript{13} One of its distinguishing features is a thin red (-brown) band directly underneath its cortex rind (Figure 9.4). There the flint has become more fine-grained, more transparent and lighter in colour. Towards the core it may change to brown and eventually to dark and light grey, which is commonly observed among unaltered Lanaye flints.

9.3.5 Rullen flint

Based on strong discolourations towards yellow, yellow-brown and light brown, a portion of the flint has been classified as Rullen flint. This eluvial type of Lanaye flint has undergone most changes in colour due to iron oxidation as part of chemical processes in iron-rich soils. Apart of the extraction point at Rullen, also flint from Sint-Pieters-Voeren exhibits similar alternations, though less extreme.\textsuperscript{14}

At Cannerberg the flint classified as Rullen flint displays significant variation in colour and inclusions (Figure 9.5). The colour ranges from (light) grey, grey brown, yellow brown, red brown to brown. The flint has a variable range of inclusions, from parts with little, to parts with many light coloured irregularly shaped clasts.

\textsuperscript{12} De Grooth 2007; 2014.  
\textsuperscript{13} De Grooth 2007.  
\textsuperscript{14} De Grooth 2014.
Among the Rullen flint there were two sub-varieties that are exclusively found within the Long pits of some of the earliest houses. These varieties are distinctive from most of the other Rullen material found at Cannerberg, but fall within the range of Rullen flint. These may relate to flint found at specific outcrops within the Rullen – Sint-Pieters-Voeren source region or they even may represent individual nodules. Due to their restricted presence within the site, both in space and time, leaving the possibility open that they relate to distinct sub-varieties of the Rullen flint, they are presented separately here.

9.3.6 Grey Rullen flint

This sub-variety is a light grey to grey fine-grained flint with a white slightly rough cortex. Directly underneath the cortex the flint is generally light grey. This zone exhibits vaguely developed banding, which sometimes has a slight brownish discolouration. The inner part is slightly darker in colour tending towards grey. It has a fine-grained texture with a greasy feel to it. This distinguishes it from most of the other flints. This flint has an overall low concentrations of small white circular to oval, as well as irregular shaped inclusions, likely representing small fossils (or fossil fragments) or incompletely silicified parts.

9.3.7 Brown-grey Rullen flint

This flint exhibits great similarity with the eluvial grey variety described above and it may originate from the same extraction point. However, it also has some differences
and it was found in different contexts, at least suggesting it relates to different nodules. Its cortex feels rough and has a yellow brown colour (Figure 9.6b). Old cleaved surfaces possess a (dark) brown patina (see Figure 9.6b, right artefact). Grain-size as well as “greasy” feel are very similar to the grey variety described above. Similar to most Lanaye flints this variety has light coloured coarser grained zones which can measure up to more than 5 cm.

The brown-grey flint exhibits much more variation in colour than the grey sub-variety, giving it quite a heterogeneous appearance (Figure 9.6a). In addition to the light grey colour, it has more brown hues with a grey "glaze" shining through it, clearly showing the brown hues are due to chemical weathering (iron oxidation). Much of the brown seems present in vague “streaks”. Some pieces have a finely speckled appearance (high concentration of very fine white carbonate inclusions, possibly fossils or fossil fragments).

9.3.8 Eluvial flints with an unknown provenance

Within the assemblage some flint types turned up that exhibited different characteristics from the commonly known varieties discussed above and below. Some of these are restricted to only a small number of features, others have a more rare, but consistent presence within the site. In all cases these relate to eluvial flints based on a number of characteristics: (a) the presence of a rough yellow-brownish cortex or (b) a brown patinated outer surface in case of old cleavage plains, and (c) the flints that either have brown colours or parts that have undergone colour change towards a more brownish hue. Among these a brown flint different from LC2 and a light grey flint have regularly been identified.

Figure 9.6
Some large flakes made from the brown-grey Rullen flint variety with (a) the ventral face displaying colour variation; and (b) the dorsal face with partial cortex cover.
9.3.9 Haspengouw flint

Haspengouw flint, in French known as *silex de Hesbaye*,\(^{15}\) has turned up regularly within the assemblage, although in small quantities. In most cases it represents a very fine-grained almost glassy flint. Coarser grained pieces also occur, but are much rarer (Figure 9.7a and b). The grain size of these latter specimens equals the Lanaye varieties. Most artefacts do not exhibit much inter-variability regarding the flint texture, colour, and type and number of inclusions, suggesting the Haspengouw flint had mainly been derived from a single occurrence.

The cortex of the Haspengouw flint is white to yellow-brown in colour and feels a little worn on the outside (Figure 9.7c). It is smoother than most of the other eluvial flints as well as the LC1 variety. This suggests that mechanical weathering has been more significant and that these Haspengouw flints may have been collected from gravel occurrences. It should be pointed out, however, that the cortex clearly differs from typical terrace flints, where in many cases the white cortex rind has totally disappeared due to prolonged erosion.

The flint itself has a heterogeneous appearance. Directly underneath the white cortex rind a 5 mm wide band may be present of a homogeneous flint with a dark grey to dark (grey) brown colour having hardly any inclusions (see Figure 9.7a and b). The flint in this band is slightly more translucent than the rest of the piece. The core of the flint consists of a more heterogeneously looking light grey flint. This flint is full of light grey to almost white inclusions of varying sizes (see Figure 9.7a). In addition it has lighter coloured irregularly shaped zones, sometimes resembling veins. The inclusions vary in

\(^{15}\) Allard 2005a,b.

*Figure 9.7* Different artefacts made from Haspengouw flint: a) flakes made from the fine-grained (top and right one) and the coarser variety (bottom and left); b) a retouched blade fragment made fine-grained Haspengouw without inclusions; and c) cortex types found on the Haspengouw flint.
size and shape; round ones can measure up to 1.2 cm, whereas more elongated oval ones can even be 2.0 cm in size.

Comparing the descriptions of Allard in his study of the rich flint assemblage from the Verlaine - Petit Paradis site in the Haspengouw region, the flint used in Cannerberg falls within the range of the fine-grained variety, called *silex fin de Hesbaye* by Allard.16

This type of flint can be found in the Cretaceous Senonian formations underlying the Haspengouw region. Raw material at Verlaine was probably obtained from two nearby outcrops within a distance of 500 m from the site.17 Other communities in the Haspengouw region exploited other outcrops and the material can also be picked from Meuse gravels.18 Gravel material, however, was not recognized among the Cannerberg assemblage.

9.3.10 Other flints

Apart from these recurrent flint types, the Bandkeramik features have also yielded more flint varieties. Many occur in small quantities and are of the Lanaye type, but distinct from the above mentioned types. It often could not be specified whether these represent eluvial flints and therefore they have been classified under "Lanaye unspecified". A dark grey to dark grey-brown variety with a high concentration of very small inclusions is recurrent. This is also true for a dark grey Lanaye flint with a slight bluish hue. In addition, river rolled flint has been identified. This material only represents a very small portion of the assemblage. This low abundance is slightly biased, as this river rolled flint was only identified among pieces possessing cortex, and may also be present among pieces not having cortex. Among this river rolled flint many small pebbles occur which have been classified as Terrace flint of unspecified nature. A very small part could be identified as river rolled Lanaye flint.

Finally one small blade made from Wommersom quartzite has been identified. Based on its slender nature and small length, which are quite distinctive from the average Bandkeramik blades, this blade likely represents an artefact made by Mesolithic groups. Furthermore some individual pieces from unknown flints are present within the assemblage. Among these unknown flints one low quality grey brown variety, represented by a few hardly reduced very small and slender flint nodules, is worth mentioning. Finally, it should be noted that Valkenburg flint is absent within the assemblage.

9.4 Acquisition and reduction

Flint working during the Bandkeramik was mainly focussed on the manufacture of a set of blade tools, supplemented by a smaller number of flake tools. This means that the detached items (flakes and blades) were the aimed product, in contrast to for example the manufacture of axes, during which the cores were the items that had further been shaped into tools. The blade tool manufacture generally followed a very standardized reduction sequence, in which cylindrical or conical shaped blade cores were formed. These were systematically reduced producing a uniform series of blades. A portion of these blades were further shaped into a set of standardized tools. The end-scraper is

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16 Allard 2005a,b.
17 Allard 2005a,b.
18 De Grooth 2014.
Apart from blades, also flakes served as blanks for tools. Most of the retouched flakes do not conform to standardized shapes and tool types, many only possessing a single retouched edge. Finally, it is noted that many exhausted (blade) cores functioned as hammer stones in flint working or hammer-rubbing stones in food processing before being discarded.

Flint working at the Cannenberg settlement fits to this general outline. The former paragraph listed the number of flint varieties of the Cannenberg community. In this paragraph, we attempt to provide an overview of how flint working can be characterized and how it was organized within the settlement. Table 9.4 summarizes the number of artefacts by type by flint variety for the entire studied sample. It is very informative to make a distinction between two types of contexts: (1) pits yielding a very high number of flints artefacts, hereafter referred to as flint working pits; and (2) long pits and other house associated pits, as well as more isolated settlement pits. Both contexts are significantly different in their composition of flint varieties and artefacts. The most notable differences relate to the abundance of flint artefacts, the flint-types present, and the stages of reduction and use that are represented by the artefacts.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>Lanaye flint, local variety 1</th>
<th>Lanaye flint, local variety 2 (oolitic)</th>
<th>Hezeghove flint</th>
<th>Bennekom flint (oolitic)</th>
<th>Bulken flint, other varieties (oolitic)</th>
<th>Bulken flint, grey variety (oolitic)</th>
<th>Bulken flint, brown variety</th>
<th>Lanaye flint, brown variety</th>
<th>Lanaye flint, light grey variety</th>
<th>Lanaye flint, unspecified</th>
<th>Lanaye flint, unspecified - spotted grey variety</th>
<th>Lanaye flint, unspecified - grey variety</th>
<th>Lanaye flint, unspecified - grey, blue variety</th>
<th>Lanaye flint, unspecified - unspecified</th>
<th>Terracotta flint (Lanaye)</th>
<th>Terracotta flint (unspecified)</th>
<th>Unspecified</th>
<th>Unspecified due to burning</th>
<th>Total N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flake tool</td>
<td>5944</td>
<td>508</td>
<td>92</td>
<td>32</td>
<td>3111</td>
<td>172</td>
<td>29</td>
<td>31</td>
<td>21</td>
<td>62</td>
<td>5</td>
<td>8</td>
<td>120</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>-</td>
<td>7155</td>
<td></td>
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<tr>
<td>Blade tool</td>
<td>87</td>
<td>21</td>
<td>11</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>7</td>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>165</td>
<td></td>
</tr>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Angular debris</td>
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<td>2</td>
<td>1</td>
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<td>-</td>
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<td>11</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>174</td>
<td></td>
</tr>
<tr>
<td>Waste (flat debris)</td>
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<td>1</td>
<td>6</td>
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<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>2</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Core re-juvenation flake</td>
<td>125</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td>11</td>
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<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
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<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Flake core</td>
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<td>1</td>
<td>-</td>
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<td>11</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>4</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
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<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>26</td>
<td></td>
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<tr>
<td>Blade core</td>
<td>71</td>
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<td>-</td>
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<td>11</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>81</td>
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</tr>
<tr>
<td>Re-used blade core</td>
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<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Unmodified material</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pebble fragment</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Undetermined</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10136</td>
<td>809</td>
<td>245</td>
<td>69</td>
<td>246</td>
<td>82</td>
<td>150</td>
<td>32</td>
<td>84</td>
<td>23</td>
<td>65</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12900</td>
</tr>
</tbody>
</table>

| ratio: flake:blade | 2.3                       | 2.8                                  | 3.0             | 1.4                     | 1.1                                 | 2.3                                | 2.5                             | 0.8                        | 1.2                              | 1.7                          | 0.3                               | 0.3                               | 1.7                             | 0.0                            | 6.0                           | 3.5                            | 1.1                           | -                            | 2.2                        |
| ratio: all flakes/all blades | 2.2                      | 2.4                                  | 0.8             | 1.2                     | 0.9                                 | 2.2                                | 2.2                             | 0.9                        | 0.9                              | 1.5                          | 0.3                               | 0.3                               | 1.4                             | 0.0                            | 9.0                           | 4.5                            | 1.0                           | -                            | 2.0                        |
The most informative contexts regarding the core preparation, core reduction, and blade production are the flint working pits, whereas the long pits and other house related features provide a much better insight into functional aspects of the flint industry as well as the use of more distant occurring flints.

9.5 Flint working pits

One of the most fascinating phenomena at the Cannerberg site are a number of pits that yielded very high quantities of flint artefacts (Table 9.5). One of these pits (S2210) had already been discovered during the first stage of the fieldwork, when its rich flint content was immediately recognized. The subsequent second and third stage of the excavations yielded another three pits (S1959, S2080, and S2454) with similar contents. The later analysis of the flint material has, however, shown that there probably are two additional pits (S6.1 and S34.1) that may have served the same purpose. This assumption is based on the presence of a very similar range of artefacts. These latter have only been recorded during the first-stage fieldwork. The material analysed represents the flint collected during opening up the first-stage units.

Most of the pits have not been fully excavated in the field. S6.1 and S34.1 were situated outside the zones were excavated during the second and third stages of the research. These features were not sectioned and the collected artefacts represent material that was found when descending with the mechanical shovel towards the proper excavation level. Pits S2080, S2210, and S2454 were only sectioned and material from one half of the feature was collected. The other half was left in the ground for future research. From S2210 a large sample (~3000 litres) was taken and sieved using a 3mm mesh-screen. S1959 was fully excavated, and also from this feature a sample (~1000 litres?) was sieved using the 3 mm mesh-screen.

We analysed a large artefact sample from all pits. This represents either all material collected during fieldwork (S1959, S2080, S2454, S6.1 and S34.1), or a representative sample (the sieved sample of S2210) (Figure 9.8). Looking at the collected quantities, it may be estimated that pits S2210 and S2454 probably contained around 10,000 or more artefacts larger than 1.5 cm. The sieved sample from S2210, representing less than a quarter of the feature, contained 7181 artefacts, of which 2615 are larger than 1.5 cm. The excavated half of pit S2454 contained 4126 artefacts larger than 1.5 cm. Since this sample was hand-collected it likely underestimates the total amount of artefacts larger than 1.5 cm present in this half.

Pits S2080 and S1959 were less rich, with respectively 446 (<50% of the total) and 213 artefacts larger than 1.5 cm. Without sectioning S6.1 and S34.1 these pits already yielded 210 and 114 artefacts, so they must likely contain over 1000 lithics. Compared to the house related pits, especially the numbers of S2210 and S2454 stand out, as the richest Langsgrube (S1980) "only" yielded a little more than 550 artefacts larger than 1.5 cm for the entire pit.

---

19 Intern student Vincent van de Aast has done the categorizing, counting and weighing of this sample under supervision of the author.
Another striking feature of these "flint working" pits is the almost exclusive use of the LC1 variety (Table 9.6). In S2454 this variety accounts for more than 99%, whereas in the other pits it varies from 81% (S2210) to almost 97% (S1959 and S34.1). The lower percentage within S2210 is mainly caused by significant use of the LC2 variety. The occurrence of the more exotic flint types, such as Rullen, Banholt, Haspengouw, and other unknown eluvial varieties, is remarkably low in these features.

Table 9.5
Number of artefacts by type by flint working pit and isolated/non-house pit.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>Flint working pits</th>
<th>Isolated pits/non-house site</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.1 26.1 1559 2080 2220 2454</td>
<td>11 32.1 207 322 332 345 548 748 893 1969 1965 2158</td>
</tr>
<tr>
<td>Flake</td>
<td>118 69 104 264 1890 2558 24</td>
<td>24 45 18 26 14 78 133 312 24</td>
</tr>
<tr>
<td>Flake tool</td>
<td>4 3 3 10 5 2 2 3 3 3 1 4 5 2 3</td>
<td></td>
</tr>
<tr>
<td>Blade</td>
<td>64 23 51 82 430 989 33 56 15 12 24 78 98 159 29</td>
<td></td>
</tr>
<tr>
<td>Blade tool</td>
<td>1 1 1 5 13 5 22 3 6 18 6 14 3</td>
<td></td>
</tr>
<tr>
<td>Tool (unspecified blank)</td>
<td>- - - - - - - - - - - - - -</td>
<td></td>
</tr>
<tr>
<td>Angular debris</td>
<td>12 9 8 27 - - - 1 2 2 - 6 5 -</td>
<td></td>
</tr>
<tr>
<td>Waste (flat debris)</td>
<td>8 5 29 16 164 533 1 5 4 23 14 39 1</td>
<td></td>
</tr>
<tr>
<td>Core preparation blade</td>
<td>- - - 2 10 - - - - - - 2 3 1</td>
<td></td>
</tr>
<tr>
<td>Core re-juvenation flake</td>
<td>2 3 19 29 9 2 1 1 1 1 1 4 2 11 1</td>
<td></td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
<td>1 1 1 4 - - - 1 1 - - 2 2 1 2 2</td>
<td></td>
</tr>
<tr>
<td>Flake core</td>
<td>- - 6 6 11 16 3 - 3 2 - 1 3 2 1</td>
<td></td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>- - - - - - - - - - - - - -</td>
<td></td>
</tr>
<tr>
<td>Blade core</td>
<td>- - 9 6 17 19 - - - 1 - - 1 - 5 3</td>
<td></td>
</tr>
<tr>
<td>Re-used blade core</td>
<td>- - 2 3 - - - 1 - 2 1 2 - 2 1 1</td>
<td></td>
</tr>
<tr>
<td>Unmodified material</td>
<td>- - 1 - - - - - 4 2 - 1 1 -</td>
<td></td>
</tr>
<tr>
<td>Pebble fragment</td>
<td>- - 2 - - - - - - - - - -</td>
<td></td>
</tr>
<tr>
<td>Undetermined</td>
<td>- 1 3 20 43 - 2 3 7 12 - 3 6 25 14 2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>210 115 216 466 2615 4126 74 1 10 159 56 65 2 55 225 291 561 70</td>
<td></td>
</tr>
<tr>
<td>Ratio: debitage/tools</td>
<td>41.0 27.5 48.5 27.6 140.2 2044.5 8.7 15.0 3.0 6.8 - 5.7 9.7 32.0 33.8 9.7</td>
<td></td>
</tr>
<tr>
<td>Ratio: flake/blade</td>
<td>1.8 3.0 2.0 3.2 4.4 2.6 0.8 0.0 0.8 1.3 2.3 1 0.5 1.0 14.0 20.0 0.8</td>
<td></td>
</tr>
<tr>
<td>Ratio: all flakes/all blades</td>
<td>1.9 3.0 2.0 3.2 4.2 2.6 0.7 0.0 0.8 1.2 2.3 1 0.5 0.9 13.8 1.8 0.8</td>
<td></td>
</tr>
</tbody>
</table>

Figure 9.8
The entire sieved sample from S2210 (N=2615; v.1073) displayed on the table during analysis.
Another distinguishing feature of the flint working pits is the presence of a significant portion of artefacts that can be related with the early stages of the reduction sequence. Not only the number of cortical flakes is higher, including the occurrence of a significant portion of primary flakes and blades (Table 9.7), the pits also contain significant numbers of very large cortical flakes (up to 15 cm in length and sometimes weighing more than 1 kg; see Figure 9.2c). These can be associated with the early stages of reduction, during which irregularly shaped nodules were coarsely modified and down-sized to the proper core types for further blade reduction. This presence of large flakes is associated with the occurrence of some very large flake cores (also up to 15 cm, some weighing more than 4 kg), that only exhibit minimal reduction (Figure 9.9). These cores can either be considered as failed attempts to arrive at blade cores, or they represented discarded poor quality blocs that were formed when reducing much larger nodules in size. It is also noted that some of these flake cores still possess large parts covered with cortex. This co-occurrence of large flakes and large flaked cores clearly distinguishes these pits from any of the house related features, where especially the large cores are totally absent.

In addition to this early reduction stage, these flint working pits also contain the debitage of the next stage: the production of blades (Figure 9.10). All pits contain a number of blade cores from which blades had been systematically reduced. The overwhelming quantity of blades further supports this. It is noted that the number of the true conical or pyramidal blade core type is not very high (Figure 9.11). Many blade cores show evidence of serving as a flake core in their final stage of reduction. This has been done according to a re-current strategy, in which the single platform from which the flakes had been detached was perpendicular to the original platform from which the blades had been detached. Based on their relatively large size, when compared to many cores from the house related features, it can be argued that the blade cores had not been exhaustively used. Most were discarded after repetitive failed attempts to detach blades, indicated by repetitive hinged scars close to the platform. Some cores bear evidence that the platform had been adjusted in order to overcome this problem.

### Table 9.6
Percentages of artefacts by flint variety for flint working pits and isolated/non-house site pits.

<table>
<thead>
<tr>
<th>Flint variety</th>
<th>flint working pits</th>
<th>other pits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanaye flint - local variety 1</td>
<td>86</td>
<td>13</td>
</tr>
<tr>
<td>Lanaye flint - local variety 2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Haspengouw flint</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Banholt flint</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rullen flint other varieties</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Rullen flint variety brown-grey</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Rullen flint - grey variety</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Lanaye eluvial - light grey variety</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lanaye eluvial - brown variety</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lanaye eluvial (unspecified)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lanaye unspecified - speckled grey</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Lanaye unspecified - grey-blue</td>
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<td>0</td>
</tr>
<tr>
<td>Lanaye unspecified</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Wommersom quartzite</td>
<td>-</td>
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</tr>
<tr>
<td>Terrace flint (Lanaye)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Terrace flint (unspecified)</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Unspecified</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

Another interesting feature of the flint working pits is the presence of a significant portion of artefacts that can be related with the early stages of the reduction sequence. Not only the number of cortical flakes is higher, including the occurrence of a significant portion of primary flakes and blades (Table 9.7), the pits also contain significant numbers of very large cortical flakes (up to 15 cm in length and sometimes weighing more than 1 kg; see Figure 9.2c). These can be associated with the early stages of reduction, during which irregularly shaped nodules were coarsely modified and down-sized to the proper core types for further blade reduction. This presence of large flakes is associated with the occurrence of some very large flake cores (also up to 15 cm, some weighing more than 4 kg), that only exhibit minimal reduction (Figure 9.9). These cores can either be considered as failed attempts to arrive at blade cores, or they represented discarded poor quality blocs that were formed when reducing much larger nodules in size. It is also noted that some of these flake cores still possess large parts covered with cortex. This co-occurrence of large flakes and large flaked cores clearly distinguishes these pits from any of the house related features, where especially the large cores are totally absent.

In addition to this early reduction stage, these flint working pits also contain the debitage of the next stage: the production of blades (Figure 9.10). All pits contain a number of blade cores from which blades had been systematically reduced. The overwhelming quantity of blades further supports this. It is noted that the number of the true conical or pyramidal blade core type is not very high (Figure 9.11). Many blade cores show evidence of serving as a flake core in their final stage of reduction. This has been done according to a re-current strategy, in which the single platform from which the flakes had been detached was perpendicular to the original platform from which the blades had been detached. Based on their relatively large size, when compared to many cores from the house related features, it can be argued that the blade cores had not been exhaustively used. Most were discarded after repetitive failed attempts to detach blades, indicated by repetitive hinged scars close to the platform. Some cores bear evidence that the platform had been adjusted in order to overcome this problem.

<table>
<thead>
<tr>
<th>N total excl. chips</th>
<th>6.1</th>
<th>34</th>
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<td>0</td>
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<td>4</td>
<td>6</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
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<td>-</td>
<td>-</td>
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</tbody>
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| Wommersom quartzite | -   | -   | -    | -    | -    | -    | -  | -   | -   | -  | -  | -   | -   | -   | -   |
| Terrace flint (Lanaye) | -  | -   | 1    | -    | -    | -    | -  | 1   | 2   | -  | -  | -   | -   | -   | -   |
| Terrace flint (unspecified) | -  | -   | 0    | -    | -    | -    | -  | 3   | 16  | 2  | 0  | -   | -   | -   | -   |

| Unspecified | -   | -   | 1    | -    | -    | -    | -  | -   | -   | -  | -  | -   | -   | -   | -   |
Still a number of cores does not show this evidence and these have been discarded for yet unknown reasons. The blade cores are on average larger than those among the Long pits and other settlement pits. Furthermore most cores do not exhibit evidence of any re-use as a hammer or hammer-rubber tool, commonly seen among these latter pit types.

The later stages of reduction are represented by an overwhelming quantity of blades and fragmented blades with little or without any cortex on their dorsal face. Based on a quick scan, it can be stated that these blades fall within a restricted size range, in which blade length in general does not exceed 8 cm. Also the width is relatively uniform.

The final stage of the blade tool manufacturing process, the finishing of the blade tools itself, is not represented among the artefacts. The number of retouched tools is extremely low, and more importantly, most of the tools found within these pits are made from other varieties than LC1 or LC 2. This leaves two options: (1) blades

<table>
<thead>
<tr>
<th>Table 9.7</th>
<th>Number of flakes and blades grouped according dorsal cortex cover for each flint variety categorized by flint working pit.</th>
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<td>1-85%</td>
</tr>
<tr>
<td></td>
<td>&gt;85%</td>
</tr>
<tr>
<td></td>
<td>Blade</td>
</tr>
<tr>
<td></td>
<td>1-85%</td>
</tr>
<tr>
<td></td>
<td>&gt;85%</td>
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<tr>
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<td></td>
<td>1-85%</td>
</tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td>1-85%</td>
</tr>
<tr>
<td></td>
<td>&gt;85%</td>
</tr>
<tr>
<td>Haspengouw flint</td>
<td>Flake</td>
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<tr>
<td>Banholt flint</td>
<td>Flake</td>
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<td></td>
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<tr>
<td>Other flint</td>
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<td></td>
<td>1-85%</td>
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<tr>
<td></td>
<td>&gt;85%</td>
</tr>
<tr>
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<td>Blade</td>
</tr>
<tr>
<td></td>
<td>1-85%</td>
</tr>
<tr>
<td></td>
<td>&gt;85%</td>
</tr>
</tbody>
</table>
Figure 9.9
A sample of flake cores from the sieved sample of S2210. Note the two large minimally modified flake cores in the back.

Figure 9.10
A portion of blades without cortex from the sieved sample of S2210.
were modified into tools at these pits, but transported elsewhere; or (2) proper sized blades were transported as unmodified blanks to other locations, where they were manufactured into tools. The available evidence supports the second option, as in case of the first option, a small portion of unfinished or failed tools would be expected. These have not been identified. Despite the many fragmented blades, none of them bear evidence of being retouched.

9.6 House related and other settlement features

9.6.1 Introduction

This section will describe the flint contents of the other pits where flint was found in significant quantities. These include the many Langsgruben, the often elongated pits, located along the houses, as well as a number of more isolated pits. A significant portion of the Long pits could be associated with one of the identified houses. For a number, however, this was not possible due to the proximity of multiple houses or because the pits had been found at the perimeter of excavation units, severely hampering any assignment to associated houses. Four pits (S335, S345, S748 and S893) have been found in areas where the opening of larger areas enabled a solid determination of the absence of any nearby house structures.

In many of the pits the upper dark coloured fills represent the last phase of use of these pits as refuse locations. These fills have yielded the majority of flint artefacts. At the Cannerberg settlement the number of flint artefacts per pit varies between around 30
to up to more 500, excluding small chips (<1.5 cm). When compared to the flint working
pits, the composition of flint varieties as well as of artefact types differs considerably.
The most striking differences are: (1) the larger variation in flint types within each
house related pit, (2) average smaller size of the material, (3) the higher percentage
of tools, (4) the predominant presence of blade cores and (5) the high percentage of
re-used blade cores as hammer stones or hammer-abraders. Another difference is the
more significant variation between these pits regarding these listed features.

9.6.2 Flint varieties

The composition of flint varieties within each house associated pit exhibits significant
more variation than within the flint working pits (Table 9.6 and Table 9.8). For most
of the pits the percentage of the LC1 variety is lower than within the flint working
pits. A total of 31 pits (77%) have percentages below 80%; only 9 more or less equal
the high LC1 percentages of the flint working pits (>80%). Among the 31 pits a large
portion (N=14; ~35%), however, has significantly smaller percentages, being lower
than 40%, with even one pit only yielding 2% of LC1. As a consequence the presence
and variation of other flint types is more significant, most of the pits containing a
mixture of at least five different flint types. Among these Haspengouw, Rullen, and
the LC2 flints are regularly present. More than 70% of the pits contain these varieties,
mostly in percentages below 10%. Some however contain higher percentages with two
exceptional cases in which 75% and 93% is represented by a single Rullen variety.

When we combine all the pits belonging to a single house yard and treat the house
yard as the analytical unit, many of the above specified aspects still hold true. All
houses (N=8) have strongly varying percentages of the LC1 variety, the range falling
between 21 and 73% (Table 9.9). All also yielded the Haspengouw, Rullen, and LC2
varieties in varying amounts. Particularly variation among the Rullen and Haspengouw
flint is significant with some houses only having 1%, whereas others had percentages
even up to 26% for Haspengouw flint and up to 46% and 61% of Rullen flint in case of
house 1 and 2 respectively. This variation in the presence of flint types suggests the
different households at Cannerberg had differential access to specific flints. In the
paragraphs below will show that this variation is strongly correlated to the different
phases of occupation.

9.6.3 Flint reduction

Similar to the flint types, variation also exists between pits in a number of other
aspects. These include the average size of the debitage, the abundance of flakes and
blades bearing cortex, and the abundance of flake and blade tools (Table 9.10 and
Table 9.11). In comparison to the flint working pits the debitage of the predominant
flint varieties within each context is on average small in size. None of the house
related pits yielded the very large flakes (>10cm) that occur in the flint working pits.
Also the large flake cores have not been identified among the Long pits. Some pits, however, contain debitage of considerable size (5-10 cm). This debitage is in all these cases found among the predominant flint variety within that pit and associated with an abundance of cortex bearing flakes. These characteristics indicate that these flint samples represent the remnants of early core reduction.

The different pit features belonging to house 1 and 2 both share these characteristics with regard to the brown-grey Rullen variety. At House 2 the absence of any brown-grey Rullen cores may suggest that cores had been transported to somewhere else and that late reduction had not occurred in this household.

Most other houses also had at least one flint variety, for which the early reduction stage could be identified. We determined this on the presence of the high percentage of cortical flakes including primary flakes (Table 9.12). This has not been established at house 12 and 14, most likely due to the small sample size and limited number of house features investigated.

At house 4 and 25 early reduction of LC1 variety had occurred as shown by the high number of cortical flakes and a significant number of primary flakes. The portion of large debitage is small, suggesting nodules had been used that did not need much pre-shaping. The relative high abundance of blades, as well as flake and blade tools indicates that also the later stages of reduction and tool manufacture had occurred in this household. This is further supported by the high number of small cores in addition to re-used ones. Inter-pit variation regarding cortical flakes within this house-yard suggests that the debitage belonging to different stages of reduction had not been discarded within the same pit, but were spread among numerous pits. This could reflect two things: (a) activities related to flint tools within the yard had spatially been differentiated and, consequently, this was also true for on the spot flint working to provide these tools; or (b) predominant discard locations of the house yard (the artefact rich long pits) varied through time.

| Feature | 2113 | 2117 | 2180 | 2194 | 2195 | 2209 | 2203 | 2205 | 226 | 2092 | 2093 | 948 | 753 | 754 | 775 | 774 |
|---------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| N total excl. chips | 17 | 10 | 118 | 19 | 30 | 18 | 55 | 29 | 79 | 16 | 203 | 203 | 44 | 78 | 61 | 20 |
| Flint variety | | | | | | | | | | | | | | | |
| Lanaye flint - local variety 1 | 71 | 30 | 11 | 37 | 37 | 18 | 31 | 94 | 38 | 2 | 36 | 52 | 69 | 70 | 40 |
| Lanaye flint - local variety 2 | - | - | 1 | - | 3 | 2 | 8 | 3 | - | 0 | 11 | 7 | 9 | 10 | 15 |
| Haspengouw flint | - | - | 3 | - | - | 35 | 15 | 3 | - | 0 | 24 | 5 | 5 | 8 | - |
| Banholt flint | - | - | - | - | - | 2 | - | - | 6 | - | - | - | - | - | - |
| Rullen flint other varieties | 6 | - | 1 | 5 | 3 | 4 | 5 | - | 6 | 1 | 1 | - | 5 | 5 | 15 |
| Rullen flint variety brown-grey | - | - | 75 | 11 | 7 | - | 10 | - | - | 93 | - | - | - | - | - |
| Rullen flint - grey variety | - | - | - | - | - | 16 | - | - | - | - | 4 | - | - | - | - |
| Lanaye eluvial - light grey variety | 6 | - | - | - | - | 5 | 8 | - | 19 | - | 0 | 11 | - | - | - |
| Lanaye eluvial - brown variety | 6 | - | 1 | 5 | 3 | 4 | 3 | - | 13 | - | 0 | - | - | - | - |
| Lanaye eluvial (unspecified) | - | - | 4 | 16 | 30 | 13 | 13 | 1 | 6 | 1 | 5 | 5 | 1 | - | 10 |
| Lanaye unspecified - speckled grey | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Lanaye unspecified - grey-blue | - | - | 10 | 1 | - | - | 2 | 5 | - | - | - | 3 | - | - | - |
| Lanaye unspecified | 12 | - | 5 | 16 | 17 | 3 | - | 1 | 12 | 18 | 8 | 3 | 15 | - | - |
| Wommersom quartzite | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Terrace flint (Lanaye) | - | - | - | 11 | - | - | - | - | - | - | - | - | - | - | - |
| Terrace flint (unspecified) | - | - | - | 11 | - | - | - | - | - | - | - | - | - | - | - |
| Unspecified | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - |

Table 9.8a
Percentage of artefacts by flint variety for pits (Langsgruben) associated with the different house sites grouped by house site. See opposite page table 9.8b for the remainder of the pits.
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<th>House</th>
<th>N</th>
<th>Lanaye flint - local variety 1</th>
<th>Lanaye flint - local variety 2 (eluvial)</th>
<th>Haspengouw flint</th>
<th>Banholt flint</th>
<th>Rullen flint other varieties (eluvial)</th>
<th>Rullen flint variety brown-grey</th>
<th>Rullen flint - grey variety</th>
<th>Lanaye flint eluvial - light grey variety</th>
<th>Rullen flint - brown variety (eluvial)</th>
<th>Rullen flint - grey variety (eluvial)</th>
<th>Lanaye flint - unspecified</th>
<th>Waspengouw flint</th>
<th>Haspengouw flint</th>
<th>Banholt flint</th>
<th>Dikken flint</th>
<th>Lanaye flint - brown variety (eluvial)</th>
<th>Lanaye flint - grey variety</th>
<th>Lanaye unspecified</th>
<th>Other flint</th>
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<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 17</td>
<td>House 14</td>
<td>266</td>
<td>95.4</td>
<td>-</td>
<td>0.4</td>
<td>1.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 19</td>
<td>House 14</td>
<td>214</td>
<td>34.4</td>
<td>16.8</td>
<td>26.1</td>
<td>1.0</td>
<td>0.4</td>
<td>0.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 18</td>
<td>House 14</td>
<td>123</td>
<td>48.0</td>
<td>2.4</td>
<td>1.3</td>
<td>2.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9.8b
Percentage of artefacts by flint variety for pits (Langsgruben) associated with the different house sites grouped by house site

Table 9.9
Percentage of artefacts by flint type for each house by phase. Green values represent most occurring variety for each context, yellow values represent varieties present for more than 10%.
184 Maastricht Millenniumbos

Feature 2113
House
2

2127
2

2175
2

2180
2

2194
2

2195
2

2039
22

2043
22

2046
22

8
1

226
1

2092
1

2093
1

2131
1

2138
1

Table 9.10 a

948
20

Artefact type
Flake
Flake tool

6
1

8
‐

1
‐

57
5

10
‐

13
‐

45
‐

27
‐

7
‐

‐
‐

35
1

4
‐

114
1

‐
‐

‐
‐

67
15

Blade
Blade tool

7
1

1
‐

1
‐

36
4

7
‐

8
‐

5
2

7
2

‐
‐

1
‐

34
3

6
2

50
2

1
‐

1
‐

61
21

Tool (unspecified blank)

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

‐

1

Angular debris
Waste (flat debris)

1
1

1
‐

‐
‐

6
7

‐
‐

4
‐

1
2

‐
‐

‐
‐

‐
1

‐
2

‐
‐

15
14

‐
‐

1
‐

9
21

Core preparation blade
Core re‐juvenation flake
Core re‐juvenation blade

‐
‐
‐

‐
‐
‐

‐
‐
‐

‐
2
‐

‐
‐
‐

‐
2
‐

‐
‐
‐

‐
‐
‐

‐
‐
‐

‐
‐
‐

‐
1
2

‐
1
‐

‐
4
1

‐
‐
‐

‐
‐
‐

‐
3
‐

Flake core
Re‐used flake core
Blade core
Re‐used blade core

‐
‐
‐
‐

‐
‐
‐
‐

‐
‐
‐
‐

‐
‐
‐
‐

‐
‐
‐
‐

3
‐
‐
‐

‐
‐
‐
‐

3
‐
‐
‐

‐
‐
‐
‐

‐
‐
‐
‐

‐
1
‐
‐

‐
‐
‐
1

‐
‐
2
‐

‐
‐
‐
‐

‐
‐
‐
‐

2
1
‐
1

Unmodified material
Pebble fragment

‐
‐

‐
‐

‐
‐

1
‐

2
‐

‐
‐

‐
‐

‐
‐

‐
‐

‐
‐

‐
‐

2
‐

‐
‐

1
‐

‐
‐

1
‐

Undetermined

‐

‐

1

‐

2

‐

1

‐

1

‐

3

1

2

‐

‐

17

Total

17

10

3

118

21

30

56

39

8

2

82

17

205

2

2

220

ratio: debitage/tools

7.5

‐

‐

12.0

‐

‐ ‐

26.5

17.0

‐ ‐

‐

18.5

5.5

66.0

‐

‐

4.5

ratio: flake/blade
ratio: all flakes/all blades

0.9
0.9

8.0
8.0

1.0
1.0

1.6
1.6

1.4
1.4

1.9 ‐
1.9 ‐

9.0
6.4

3.9
3.0

‐ ‐
‐ ‐

‐
‐

1.0
0.9

0.8
0.6

2.3
2.2

0.0
0.0

0.0
0.0

1.1
1.0

1964
4

1976
4

1979
4

1980
4

1939
25

1940
25

1942
25

1975
25

1984
25

Feature
House

702
4

753
8

754
8

774
8

775
8

500
3

Table 9.10 b

529
3

Artefact type
Flake
Flake tool

2
2

161
1

113
9

1
-

229
15

16
1

36
1

5
1

18
1

67
2

108
5

83
19

8
4

-

76
4

1
-

Blade
Blade tool

5
2

52
4

81
9

-

150
16

22
1

22
4

9
1

27
6

81
5

103
12

144
25

12
4

2
-

55
15

-

Tool (unspecified blank)

-

-

2

-

1

-

-

-

-

-

-

-

-

-

-

-

Angular debris
Waste (flat debris)

1

4
30

6
6

-

7
15

2
-

1
3

1
-

1
3

3
4

10
5

8
9

2
1

-

3
8

-

Core preparation blade
Core re-juvenation flake
Core re-juvenation blade

1
-

10
-

8
-

-

14
2

-

4
-

1
-

1
1

4
-

1
-

3
1

1
1

-

1
-

-

Flake core
Re-used flake core
Blade core
Re-used blade core

2
2
3
1

1
1
-

3
4
-

-

7
5
3
6

1
1

3
1
1

1
-

1

1
1
-

2
1
2
-

1
1

-

-

4
2
1
-

-

Unmodified material
Pebble fragment

-

1
-

1
-

-

6
2

-

2
-

1
-

2
-

-

1
-

-

1
-

-

2
-

-

Undetermined

2

14

5

-

60

1

6

3

1

13

8

3

-

-

3

-

Total

23

279

247

1

538

45

84

23

62

181

258

297

34

2

174

1

ratio: debitage/tools

2,3

51,4

11,9

13,5

20,0

13,2

8,0

7,3

22,7

13,4

5,6

3,1

ratio: flake/blade
ratio: all flakes/all blades

0,6
0,7

3,3
3,1

1,5
1,4

1,6
1,5

0,7
0,7

1,8
1,6

0,7
0,7

0,7
0,6

0,9
0,8

1,1
1,0

0,6
0,6

0,6
0,7

-

7,5
0,0
0,0

1,4
1,2

-


Table 9.10 a, b and c.
Number of artefacts by type for each individual house associated pit grouped by house site. House sites are in order of ascending occupation phase.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>Feature House</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1411</td>
</tr>
<tr>
<td>Flake</td>
<td>20</td>
</tr>
<tr>
<td>Flake tool</td>
<td>-</td>
</tr>
<tr>
<td>Blade</td>
<td>16</td>
</tr>
<tr>
<td>Blade tool</td>
<td>10</td>
</tr>
<tr>
<td>Tool (unspecified blank)</td>
<td>-</td>
</tr>
<tr>
<td>Angular debris</td>
<td>3</td>
</tr>
<tr>
<td>Waste (flat debris)</td>
<td>2</td>
</tr>
<tr>
<td>Core preparation blade</td>
<td>-</td>
</tr>
<tr>
<td>Core re-juvenation flake</td>
<td>1</td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
<td>-</td>
</tr>
<tr>
<td>Flake core</td>
<td>2</td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>1</td>
</tr>
<tr>
<td>Blade core</td>
<td>-</td>
</tr>
<tr>
<td>Re-used blade core</td>
<td>-</td>
</tr>
<tr>
<td>Unmodified material</td>
<td>-</td>
</tr>
<tr>
<td>Pebble fragment</td>
<td>-</td>
</tr>
<tr>
<td>Undetermined</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
</tr>
</tbody>
</table>

ratio: debitage/tools 4.2 3.2 3.6 3.7 3.0 7.2 2.3 2.1 1.3 0.5 0.7
ratio: flake/blade 1.3 0.9 1.1 1.7 1.4 1.0 1.4 0.5 0.7
ratio: all flakes/all blades 0.8 0.8 0.9 0.9 1.0 1.1 3.0 0.4 0.5

Table 9.11
Number of artefacts by type grouped by individual house site. House sites are in order of ascending occupation phase.

<table>
<thead>
<tr>
<th>Artefact type</th>
<th>House Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Flake</td>
<td>95</td>
</tr>
<tr>
<td>Flake tool</td>
<td>6</td>
</tr>
<tr>
<td>Blade</td>
<td>5</td>
</tr>
<tr>
<td>Blade tool</td>
<td>-</td>
</tr>
<tr>
<td>Tool (unspecified blank)</td>
<td>1</td>
</tr>
<tr>
<td>Angular debris</td>
<td>12</td>
</tr>
<tr>
<td>Waste (flat debris)</td>
<td>8</td>
</tr>
<tr>
<td>Core preparation blade</td>
<td>-</td>
</tr>
<tr>
<td>Core re-juvenation flake</td>
<td>-</td>
</tr>
<tr>
<td>Core re-juvenation blade</td>
<td>-</td>
</tr>
<tr>
<td>Flake core</td>
<td>3</td>
</tr>
<tr>
<td>Re-used flake core</td>
<td>3</td>
</tr>
<tr>
<td>Blade core</td>
<td>4</td>
</tr>
<tr>
<td>Re-used blade core</td>
<td>3</td>
</tr>
<tr>
<td>Unmodified material</td>
<td>-</td>
</tr>
<tr>
<td>Pebble fragment</td>
<td>60</td>
</tr>
<tr>
<td>Undetermined</td>
<td>-</td>
</tr>
<tr>
<td>N total</td>
<td>199</td>
</tr>
</tbody>
</table>

ratio: debitage/tools 20.0 23.5 32.0 15.5 4.5 10.8 8.7 2.9 6.9 2.3 2.1
ratio: flake/blade 19.0 6.6 1.7 1.9 1.1 1.0 0.8 2.3 0.5 0.7
House 4 is the only house (within the analysis) that produced a significant percentage of the “other” Rullen flints, excluding the typical brown-grey and grey varieties. This flint type is represented by the abundance of cortical flakes in addition to tools and cores suggesting the entire reduction-use sequence had occurred at the house.

House 22 is the only house that produced a reasonable amount of Haspengouw artefacts. At this house the cortical flakes outnumber the non-cortical flakes. Primary flakes have not been found and both cores and tools are absent. This suggests that only reduction in the earlier stages had occurred and that tools produced during this stage had been discarded somewhere else. Also the core associated with this reduction must have been transported and discarded somewhere else.

House 8 and House 2 are the other contexts where early reduction related of the LC1 variety has been identified, as indicated by a high percentage of cortex bearing flakes.
Reduction probably was not part of the initial phase, as primary flakes are absent within both contexts and the percentages of blades with cortex are low (12% and 18%).

### Table 9.12 b

<table>
<thead>
<tr>
<th>Phase</th>
<th>Flake</th>
<th>Blade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortex</td>
<td>0%</td>
<td>-</td>
</tr>
<tr>
<td>1-85%</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>&gt;85%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Flake</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>1-85%</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>&gt;85%</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

| Flake | 0% | - | 3 | - | 28 | 3 | 4 | 5 | 3 | - | 3 |
| 1-85% | 1 | - | 1 | 17 | 1 | 5 | 3 | - | 2 | - | - |
| >85% | - | - | 2 | - | 1 | - | - | - | - | - | - |

| Flake | 0% | - | 2 | 19 | 6 | 8 | 10 | 8 | 3 | 4 |
| 1-85% | 1 | - | 9 | - | 2 | 7 | 2 | - | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | - | 11 | 3 | 12 | 5 | 1 | 5 | 6 | 1 |
| 1-85% | - | - | 3 | 5 | 1 | 3 | 7 | 7 | 2 | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | - | 2 | - | - | - | - | - | - | - | - |
| 1-85% | - | - | 1 | - | 1 | 3 | 3 | - | - | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | - | 37 | 1 | 2 | 2 | 2 | 1 | 3 |
| 1-85% | - | - | 3 | 1 | 34 | - | - | 1 | 2 | - | 1 |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | - | 15 | - | 3 | 2 | 5 | 2 | - | - |
| 1-85% | - | - | 1 | - | 1 | 3 | 3 | - | - | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | - | 38 | - | 3 | 9 | 2 | 1 | 4 |
| 1-85% | - | 1 | - | 15 | - | 2 | 2 | 1 | 3 | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | 72 | - | - | - | - | - | - | - | - |
| 1-85% | 19 | - | 32 | - | - | - | - | - | - | - | - | - |
| >85% | 2 | - | 5 | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 3 | - | 19 | 34 | - | - | 1 | 2 | - | 1 |
| 1-85% | - | - | - | - | - | - | - | - | - | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 2 | 19 | 13 | 5 | - | 2 | 17 | 7 | 6 | 1 |
| 1-85% | - | - | 3 | 14 | 1 | - | 1 | 3 | - | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - |

| Flake | 0% | - | 1 | - | 2 | - | 8 | 3 | 4 | 13 | 3 | 7 | 1 |
| 1-85% | 11 | - | 31 | - | 3 | 8 | 35 | 7 | 4 | 7 | - | - | - |
| >85% | - | - | - | - | - | - | - | - | - | - | - | - | 1 |

Table 9.12 b

Number of flakes and blades grouped according dorsal cortex cover for each flint variety categorized by house site.

### 9.6.4 Later stages of reduction and tools

The presence of many blade and flake tools as well as exhaustedly reduced blade cores, often re-utilized as hammer or hammer-abrader stones, within the house related and other settlement pits clearly signifies that the final stages of the flint tool manufacturing process had occurred within the household. To obtain an insight into these final stages, during which blades were predominantly being produced, we looked at the flake:blade ratio per pit and per house (Table 9.11). Again, variation is noted with (1) contexts yielding a predominant amount of flakes, (2) pits in which the...
number of flakes is a little higher or equal to blades, and (3) pits that have produced more blades than flakes. Most of the contexts where flakes by far outnumber blades are also contexts where early reduction stages are well represented. House 2 and 22 with ratios of 19.0 and 6.6 can be placed in this first group. From this it may be concluded that within these contexts early reduction is predominant. Within house 1 and 4, flakes outnumber blades less significantly (ratio 5:3), whereas at house 12 both artefact types approximate equality. In house 2 the number of cortex bearing flakes is relatively low (~30%), suggesting the later stages are better represented. In the other two houses early reduction is well represented too. The houses of group three are 8, 25 and 14. Here the relative high number of blades is accompanied with evidence of early reduction as shown by high number of cortical flakes. House 8 and 14 indicate that the blade tools by far outnumber the flake tools, with blade tool:flake tool ratios of 3.0 and 13.0.

Caution should be taken when following this line of reasoning too far. Apart from being evidence of later reduction, these low flake:blade ratios may also indicate that pre-made blade blanks had been obtained from elsewhere rather than being locally produced. This will be discussed below.

9.6.5 Tools

The settlement context of the excavated features is well reflected in the high number of tools that has been identified. Within the sample of almost 13,000 artefacts larger than 15 mm, 480 tools are present (Table 9.13). Basically every context (house-pits, isolated pits and flint working pits) have yielded tools. As already specified above, the percentage of tools per context varies significantly. The flint working pits show very low percentages (between 0.05% and 3.48%) whereas for the house and other, more isolated, pits this percentage is much higher (between 2.7 and 15.7%) (Table 9.5). Again variation is present between the different pits and between the house yards. In general it can be stated that contexts yielding relatively high numbers of tools, also have low flake:blade ratios, suggesting predominance of later reduction stages or import of blade blanks. Contexts where blades are predominant are also contexts where blade tools outnumber flake tools. These correlations support the scenario of tool manufacturing within the household for its own needs.

In general, twelve tool types have been identified, including two types, retouched and un-retouched implements with polish, that encompass a variety of tools. Despite this set of tool types only three of these are recurrently present. Most frequent are end-scrapes, followed by the more diverse groups of retouched implements and un-retouched pieces exhibiting only polish. Among the other types drills and notched pieces are relatively common. Arrow heads, quartiers d’oranges, truncated pieces and other types of scrapers are relatively rare. Finally, a pic and a pointed blade are only represented by a single specimen.

The most common tool types, end-scrapers, retouched implements and un-retouched pieces only exhibiting polish, have been found at almost all house-sites, as well as in pits not attributed to one of the house yards (Figure 9.12). It is especially noted that end-scrapers predominate in artefact and tool rich contexts. Among the house-sites with many artefacts and tools, however, variation is noticed, with house 4 having the highest number of tools including 50% end-scrapers, whereas within the sample of house 12 this percentage is only 28%. The other recurrent groups exhibit similar
variation. Expectedly, as house (4) yielded most tools, it also yielded the richest set of tool types; this "richness" diminishes with sample size. House 15 forms an exception, only 10 tools were found distributed over 7 different tool types.

When we take a closer look at the relative number of tools, using the debitage:tool ratio as a proxy,\(^\text{20}\) it may be noted that variation exists and some interesting patterns can be discerned. As already pointed out, there is a clear difference between the flint working pits and the remainder of features. The flint working pits have high to very high ratios (27.5 – 2044), whereas for the other contexts these ratios vary from low to high (3 – 33). These differences, of course, indicate that the flint working pits predominantly represent material produced by blade core preparation and reduction, whereas the other contexts represent a combination of blade core reduction, tool manufacture and pre-finished tool or blade blank acquisition.

When we compare these values for each flint type by context, it is evident that for some of the eluvial varieties originating from more distant localities (Haspengouw, Banholt, some of the Rullen sub-varieties and other unknown varieties) these ratios are repetitively low (<6). In many cases these contexts have not yielded core artefacts. This combination may be explained in one of the three following ways: (1) the household acquired blade and flake blanks from another community; (2) cores made from these flint types were communal possessions that were shared between the different households, and reduced within each household when needed; (3) one household possessed one or more cores and distributed blade and flake blanks to other households within the community.

**Figure 9.12**
A typical set of tools found in a house related pit (S1942) associated with house 25: a) the entire two left columns display scrapers on flakes; on the right half of the picture the top row centre right is a retouched blade fragment; top right is retouched flake with curvate edge; second row display two endscrapers on blades; third row is a small retouched blade fragments; bottom row display a drill on a blade (left) and drill on a flake (right); b) top row (from left to right): two drills on blades, two retouched blade fragments and a retouched flake; middle row: four endscrapers on flakes and a steep retouched blade; bottom row: five endscrapers on blades.
The fact that most blades and blade tools made from the Haspengouw flint type are more slender than the blades made from the local LC1 and LC2 varieties, suggest that these blades were perhaps manufactured by a different knapper. This would entail that either acquisition from another community occurred or that a knapper from another community was settled at the Cannerberg and distributed the blanks. Since the low ratios are consistent with the Haspengouw, Banholt and some of the Rullen flint types, the small amount of debitage combined for the entire settlement cannot explain the presence of all the tools. This would entail that only some tools had been locally manufactured, and that at least a part must have been acquired from somewhere else.

For the more local LC1 and to a lesser extent the LC2 this ratio exhibits a different pattern. Given the fact that in many contexts these two varieties had been locally reduced, these ratios are on average high; therefore there is no indication that blade blanks or tools had been transported. In paragraph 9.6.6, however, evidence will be discussed that may indicate the contrary.

### 9.6.6 Cores and re-used cores

One tool type, that has not been dealt with so far, is the exhausted flake or blade core utilized as hammer stone or hammer-abrader. This is a recurrent tool type among house related features. It is also found in most of the isolated pits, but is rare among the flint working pits (see Table 9.5, Table 9.9 and Table 9.10) (Figure 9.13). Only two of the latter (S2080 and S2210) have yielded re-used cores, whereas in two other flint working pits with many cores they are absent. Especially for pit 2454, where more than 31 cores have been found, this absence is striking.

Microscopic use-wear studies have not been done on these tools, but from macroscopic features on the used faces it is clear that at least two types of tools are among these re-used cores. Most have clear pitted areas in which the pits are pronounced and their edges sharp. These have been used as true hammers.

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**Table 9.13 a** Percentage of tool type for each flint working and isolated/non-house pit.
probably in flint working. A significant part however possesses used faces on which these pits exhibit clear signs of abrasion. Most likely these cores had been utilized in both a hammering and abrading or grinding motion. This could have been done simultaneously as hammer-abrader, or firstly as a hammer and later as an active grinder or abrader. Most probably these types of re-used cores represent tools for food-processing activities.

At first, the study of the flint types that are represented among these re-used cores reveals some unexpected results. It is noted that the relatively rare flint types are overrepresented among these tools. Around 50% is made from varieties other than the "local" LC1 and LC2, whereas among the entire sample of flint artefacts found in the houses and other pits (excluding the flint working pits), these varieties make up one third of the total. The re-used cores not only include more frequent examples of the Banholt, Rullen and Haspengouw types than would be expected on the basis of their relative abundances within the assemblage. There are also some flint varieties present that occur very rarely or may be regarded as unique in the collection. Especially this latter aspect is intriguing. It at least indicates that not only availability determined the choice which cores were being re-used, but also other aspects played a role. Given the great variation in texture, colour and quality of these other flint types, it is not likely that one of these features were of importance. The feature they all share is that they are relatively rare, or even unique, and this aspect may have been relevant.

When we further elaborate on this notion, there is another intriguing feature regarding these re-used cores. At some house yards, such as house 2, 4 and 8, their number is relatively high when compared to the amount of debitage found, particularly when it is taken into account that these house sites also yielded a high number of non re-utilized cores. This may suggest that not all cores had been reduced locally and some had been transported to the house yard in an already reduced form. If we combine this with the fact that some of the re-utilized cores had been made from unique flint varieties for

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Table 9.13b
Percentage of tool type for each house site.
which no associated debitage could be identified, it is likely that these specimens were transported to the household in an already reduced form or even as a tool.

9.7 Flint use through time

Detailed analyses of pottery decoration in combination with spatial distribution of the different houses and associated features have enabled us to date the different houses and isolated features to one of the occupation phases at the site. Earliest occupation has been identified at house 24, which is dated to ceramic phase 9, corresponding with Modderman phase 2a. The latest houses are Houses 11, 18 and 19 which are placed in ceramic phase 20 (Modderman phase 2d), when occupation probably still occurred as one of the flint working pits (S2454) has been attributed to this phase.

*Figure 9.13* Four blade cores used as hammer stones or hammer grinders.
Table 9.9 lists the flint varieties used within different houses and isolated features according to their occupation phase. The earliest house 24 has not yielded much flint and was therefore left out of the analysis. From the table it becomes clear that the predominant flint types changed through time. The early houses 2, 22, and 1 contain a different suite of flint types, with relatively low abundances of the LC1 variety. Also an isolated pit (S335) attributed to phase 12 has a very low LC1 abundance. Particularly house 2 and 1 yielded high abundances of the very characteristic brown-grey variety of the Rullen flint, which was the predominant flint variety for these houses. The Banholt variety is predominant in pit S335 and the two most common flint varieties in House 22 are LC1 and Haspengouw flint, which both occur in relatively low percentages.

From ceramic phase 14 onwards LC1 clearly becomes the most abundant variety with percentages generally over 50%. One of the flint working pits (S2210) has been dated to the following ceramic phase 15 and the predominant use of the LC1 variety within the houses may be associated with this appearance, as pit S2210 contains over 80% of the LC1 variety. House 25 occupied within phase 16 has the highest abundance of LC1 flint (73%). Two pits (S1963 and 1965) from the same phase have even higher percentages (95%). After this phase the percentages of LC1 flints drop again: almost 60% for pit S46.11 attributed to phase 17; 48% and 33% for respectively house 14 and 12 of phase 18; and only 30% for the only pit (S807) studied belonging to house 13 and attributed to phase 19. These younger houses and pits exhibit variation with regard to other abundant flint varieties. LC2 has percentages above 10% for three contexts, whereas for Haspengouw flint this is only the case for houses 12 and 14. Pit S807 also produced more than 20% of Rullen flint.

These data show that despite the local LC1 variety was known to the Cannerberg inhabitants from the beginning, they did not prefer it during the earliest phases. Phase 14 marks a turning point, as LC1 clearly becomes the dominant flint. This seems to be associated with appearance of the flint working pits, where this variety was present in great quantities. During the later phase LC1 declines in importance again, although it remains the most commonly used flint type.

Taking a look at the other varieties it is noticed that their use does not form a consistent pattern. Only the specific greyish Rullen varieties seem to be restricted to and predominant within, the earliest phases. The other common varieties, such as LC2, Haspengouw, Banholt, and the other Rullen flints exhibit more variation through time.

9.8 Discussion

The flint working pits are intriguing and immediately raise questions as to what purpose they served. The first explanation may be that the blades, being produced in great quantities, were distributed among the Cannerberg community itself and perhaps among neighbouring sites. The house yards, however, showed that each house yard post-dating phase 14 was involved in its own reduction of LC1 blade cores and its own manufacture of LC1 blade blanks and tools. At first glance there does not seem to be any evidence for the distribution of pre-manufactured blade blanks from the flint working pits to these house yards.

When we take a closer look at the debitage:tool ratio for each house yard and start comparing this ratio through time, a pattern emerges that may point to the opposite. It is noted that this ratio drops significantly when the Cannerberg community more
heavily started relying on the LC1 flint (phase 14), which is also associated with the appearance of the flint working pits. This may be an indication that the flint working pits at least served a local purpose and to some part provided the different house-holds blanks for further tool manufacture.

Given the high number of blades found in these pits this reduction most likely resulted in the generation of a surplus production. The numerous blanks must have outnumbered the amount of blades that were distributed among the settlement. Unfortunately, the subtle differences between house yards predating and postdating the appearance of the flint working pits accompanied with the increase of local LC1 use, make it difficult to exactly quantify the number of blade blanks each later house yard obtained.

The subtle differences at least show that the amount of locally distributed blanks probably remained low and cannot account for the large quantity of blade blanks that had been produced within these flint working pits. This suggests that a portion of these blade blanks were transported elsewhere, outside the settlement. The most likely option would be to other communities. The fact that the Cannerberg community still acquired non-local flint types despite having access to a wealth of local material, shows that possessing non-local materials or at least having access to them was considered important. Other communities must probably have acted the same. Different underlying mechanisms may be held responsible for this pattern, but inter-community exchange and inter-community migration of people bringing in exotic flints may best explain these phenomena. The former mechanism is particularly responsible for the transport of locally made blade blanks between the different neighbouring communities, clarifying the overrepresentation of tools among some of the non-local materials within the Cannerberg community. In addition, the slender form of the Haspengouw blades suggests that they were manufactured by knappers using a slightly different reduction protocol than the average knapper within the Cannerberg community. If we combine this possibility with the lack of Haspengouw cores and very low quantities of debitage during these later phases, it indicates that these blades had probably been manufactured elsewhere and by knappers not part of the Cannerberg community. Knappers living in a settlement in the Hesbaye region having access to the Haspengouw flint occurrences are probable candidates. This fits well with the picture Allard presents on the distribution of Haspengouw flint, in which both pre-worked cores as well as finished tools were being transported or exchanged between communities. 21

In case of hammer stones made from unique flint varieties, inter-community migration of flint workers rather than inter-community exchange can be brought forward as an explanation for their appearance at Cannerberg, assuming these hammer stones were personal tools. Their uniqueness without any associated debitage at least indicates that these cores had not been reduced at the Cannerberg site, but arrived to this settlement as exhausted cores or hammer stones. Still it cannot be excluded that for the acquisition of part of the "exotic" varieties, Cannerberg community members visited the more distanced flint outcrops and collected raw material themselves. Especially during the earliest occupation the predominance of locally reduced Rullen flints suggests that access to the Rullen

21 Allard 2005a,b.
outcrops may have been direct. These phases also provide the best evidence for on-site reduction of Haspengouw flint. For later phases this may also have been the case for some of the locally reduced exotic materials.

9.9 Conclusions

The Bandkeramik Cannerberg settlement has yielded a very rich and diverse flint assemblage. Approximately 30,000 artefacts were recovered. This high number may for a large part be attributed to the presence of a number of pits that contain the debitage of early and subsequent blade core reduction and blade manufacture associated with a local Lanaye flint variety. The exact origin of this local variety is still unknown, but likely can be found in the vicinity of the settlement. The source probably relates to a secondary occurrence of the flint, most likely a hill slope wash and not an eluvial context.

Careful analysis per ceramic phase showed that this local variety had not been predominant throughout the entire occupation at Cannerberg. During the earliest phases the Cannerberg people mostly used specific Rullen flint varieties. From phase 14 onwards the local variety became most important. It is also shortly after this phase that the first flint working pit appears. Flint working at these pits probably fulfilled a local as well as a more regional purpose, providing the Cannerberg community and its neighbours with blade blanks.

Apart from acquisition of these blade blanks each house yard had been involved in its own manufacture of blade and flake tools as shown by the repetitive presence of flint working debitage in the long pits. Similar to the flint working pits the local Lanaye variety is predominant in the later phases, whereas the predominant use of other varieties is restricted to the earliest occupation at Cannerberg.

Finally, evidence exists that points to import of flint material and tools made from exotic varieties. Some material may have arrived though inter-community exchange. This particularly accounts for the import of tools. Exotic re-utilized blade cores and perhaps exotic raw materials may have been brought in by migrants coming from communities that have access to these materials. In some cases it cannot be excluded that the locals acquired some of the locally reduced exotic materials by visiting the outcrops themselves. Particularly during the earlier phases this seemed to have been the mechanism by which some of these materials came to the Cannerberg site.
Stone artefacts at the Cannerberg

Annemieke Verbaas

10.1 Introduction

At Maastricht Cannerberg a large site was excavated with stone finds dating from the Early Neolithic Linear Bandkeramik (LBK) to the present-day. Within this large body of material three assemblages could be distinguished based on the finds and features: the LBK, the Iron Age and the Roman era. As many more features and artefacts were found than initially expected, choices had to be made for the analysis of the stone materials. Of the final amount of 4015 artefacts only a small selection could be analyzed in detail. Also the use wear analysis of the stone tools had to be limited.

Therefore it was decided to perform an extensive pilot analysis focusing on the registration of tool types and amount of heated artefacts per find number. Subsequently extra attention was paid to the LBK stone artefacts, with the material from five yards and four pits being studied in greater detail. Next, all adzes, ground pieces of ochre and tools with a smooth surface from LBK contexts were selected for microwear analysis. It was hoped that this sampling strategy would reveal insight into the composition of the assemblage and would allow a comparison between five different house-yards and some pits. It was also decided to keep this report short and descriptive with a focus more on making the data available and less on the implications of the findings for current theories about the LBK in the Netherlands and abroad.

With this approach the analysis of the stone tools contributes to the overall research questions defined for the Cannerberg project answering the following questions:

1. What are the differences in the use of stone between the LBK and the Iron Age in terms of tool type composition and extent of heating?
2. Which activities were performed within the LBK yards?
3. Are there any differences between the stone assemblages found in the pits connected to the yards and those pits that were not associated with a specific house yard for the LBK?
4. How and for what activities were the adzes and the stones with a smooth surface used?
5. How were the ground pieces of ochre pulverized?

10.2 Methods and selection

During the excavations a total of 4015 stone artefacts were found. Unfortunately only a small selection of these could be analyzed in detail. An extensive pilot analysis was done to get an insight into the composition of the assemblage and to be able to make an informed selection of the artefacts to analyze. For this pilot analysis the total amount of finds per find number were recorded and the number of tools and heated stones were counted. The sieve residues were treated in a different way. As the added variables described are: Amount, amount heated, amount with uncommon raw material, amount with use wear potential, amount of special artefacts, amount of querns (and amount with ochre), grinding stones, hammer stones, ground ochre, adzes, adze fragments, pound/polishing stones, stones with a smooth surface and possible tools. There was also space for remarks.

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1 Variables described are: Amount, amount heated, amount with uncommon raw material, amount with use wear potential, amount of special artefacts, amount of querns (and amount with ochre), grinding stones, hammer stones, ground ochre, adzes, adze fragments, pound/polishing stones, stones with a smooth surface and possible tools. There was also space for remarks.
value of counting the amount of pieces in these residues is limited, they were only scanned for the presence of tools or tool fragments. These were registered separately and the total amount of stone pieces was set to zero in the database.

For the LBK a further selection for analysis was made based on the results of the pilot and the results of the study of features, structures, as well as the dates of the features and the other find categories. The Iron Age and Roman era finds were not studied any further. For the LBK it was decided to analyze the material of five different yards, four pits and all the adzes, ground pieces of ochre, and tools described as ‘smooth and with a flat surface’. From the selected contexts all tools and artefacts with traces of manufacture or use other than heating or breakage were described extensively\(^2\). For the other artefacts all finds from one find number were grouped based on primary (technological) classification, artefact type, raw material and whether or not they were affected by heat. These were subsequently described in the database as a group\(^1\).

During both the pilot and final analysis a hand lens and a Nikon Stereomicroscope (magnifications 10-64x) were used.

All adzes, ground pieces of ochre and tools with a smooth surface were fully described and subsequently subjected to use-wear analysis. The implements were first studied using a Leica M80 stereomicroscope to assess the morphology of the tool and the possible presence of residue and the relation between the used zones. Subsequently the tools (except for the pieces of ochre) were examined with a metallographic microscope (Leica DM 2700) with incident light and magnifications of 100-200x. These high magnifications allow an interpretation of the wear traces on the basis of their topography, their distribution over the surface and other features of the use wear polish. For an extensive description of the methodology of microwear analysis and a description of the characteristics of wear traces on stone tools, see various studies of Van Gijn.\(^4\)

Most tools were already cleaned by the excavator. If additional cleaning was necessary this was done using water and if necessary an ultrasonic tank. Pieces that were left unwashed were cleaned in several stages and were inspected for traces of residue after each cycle.

10.3 Results

The entire assemblage, excluding the sieve residues, consists of a total of 4015 stone implements. Based on the pottery, features and other materials the stone objects date from the LBK to the present-day. As only few stones tools were datable, the dating of the stones tools was based on the analysis of the associated pottery and the features. Therefore only the stone tools from the features can be assigned to a period with any certainty. A total of 3596 stone implements could be allocated to the LBK (N=1285), Iron Age (N=2231) and Roman era (N=80). These artefacts are described in their relevant passages of this report.

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2 The variables described are: amount, length, width, thickness, weight, fragment, primary classification, tooltype, raw material, natural surface, residue, whether or not they were affected by heat, the presence of macroscopically visible production traces, use and renewal traces and general remarks.

3 Variables described are: the number of artefacts in the group, total weight, primary classification, artifact type, raw material, natural surface and traces of heating.

10.3.1 Morphological and typological analysis of pilot analysis

A total of 1285 finds can be attributed to the LBK with certainty and they comprise a total weight of 152 kg. Of the finds, 204 fragments (16%) show traces of heating (Table 10.1). The objects with traces of heating are mostly unworked pieces, but also tools were affected by heat. When we compare the amount of tools found at Cannerberg with what has been retrieved from other LBK sites, it becomes clear that this site yields a relatively large number of stone artefacts, especially considering the fact that not all of the features were fully excavated.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
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</thead>
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<tr>
<td>Total number</td>
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</tr>
<tr>
<td>Heated</td>
<td>204</td>
<td>15.9</td>
</tr>
<tr>
<td>Total tools</td>
<td>277</td>
<td>21.6</td>
</tr>
<tr>
<td>Quern</td>
<td>109</td>
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</tr>
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<td>Quern with ochre</td>
<td>45</td>
<td>3.5</td>
</tr>
<tr>
<td>Grinding stone</td>
<td>19</td>
<td>1.5</td>
</tr>
<tr>
<td>Grinding stone soft sandstone</td>
<td>5</td>
<td>0.4</td>
</tr>
<tr>
<td>Hammerstone</td>
<td>5</td>
<td>0.4</td>
</tr>
<tr>
<td>Polished ochre</td>
<td>23</td>
<td>1.8</td>
</tr>
<tr>
<td>Adze</td>
<td>7</td>
<td>0.5</td>
</tr>
<tr>
<td>Adze fragment</td>
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<td>1.1</td>
</tr>
<tr>
<td>Pound/polishingstone</td>
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<td>0.1</td>
</tr>
<tr>
<td>Smooth surface</td>
<td>10</td>
<td>0.8</td>
</tr>
<tr>
<td>Possible tool</td>
<td>39</td>
<td>3.0</td>
</tr>
</tbody>
</table>

The relative percentages of tool types found at Cannerberg is comparable to the other LBK sites, with the exception of the querns: even though the percentage of querns varies highly across individual LBK sites, the 12% of querns found at Cannerberg is exceptionally high.

Of the total amount of stone objects found from LBK context, 581 (45%) can be attributed to one of the yards (Table 10.2). Of these 17% (N=101) display signs of heating and 24% (N=138) can be classified as tools. Most of the yards only yield a few finds, but several yards yield many more finds (Table 10.2). Even though this difference is mainly caused by the amount of features that could be assigned to a certain structure and the amount of the pits that was excavated per yard, some general comments can be made.

In general all tool types were found in similar percentages across the yards. As the pits associated with the yards are believed to be waste-pits used during the use of the house to deposit household waste, it may be concluded that all activities performed in the Cannerberg LBK settlement were performed on a household basis. This includes woodworking and tree felling, which was always assumed to have been done using adzes and the grinding of red ochre, which has a special relevance and meaning in LBK society.

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5 Even though this seems the case for his assemblage, these notions are highly debated (see for example Van Gijn & Mazucco 2013).
6 For example Bakels 1987.
7 Van Gijn & Verbaas 2009; Wijnen 2015.
Recent research has shown a system of apprenticeship and settlement development at the site of Cuiry-lès-Chaudardes. The site showed that there is a difference in house type with regards to houses with a high ratio of querns (related to processing of crops) versus houses with an overrepresentation of grinding tools (indicating a focus on craft activities). When combined with the information on the bones from domesticated versus wild animals it was shown that the higher ratio of grinding tools indicated new inhabitants to the site. This led to a new model of social organization for the site. As animal bones are notoriously absent from Dutch LBK sites due to poor preservation circumstances for the Cannerberg site this model could only be applied to house types and stone tools. A similar analysis was performed for the Cannerberg as well, but unfortunately no such patterns could be observed.

There are however some differences between the yards. In general it is assumed that households processed their own cereal, represented by at least one quern in every house. It is therefore remarkable that there are several yards were no querns were found at all. However, these yards yield less finds anyway and it should be stressed that not all pits could be assigned to a house yard and not all pits were fully excavated, so no statements can be made about the absence of querns. In contrast, yards 8, 13, 20, 25 produced a very high percentage of querns. These yards may be interpreted as houses where people got together for meals, parties or other forms of assembly.

8 Gomart et al. 2015
9 Hachem & Hamon 2014; Gomart et al. 2015

| Yard no. | Pottery phase | Total | Amount heated | % heated | Total amount tools | % tools | Quern | %quern | Grinding stone | % grinding stone | Hammerstone | % hammerstone | Polished ochre | % polished ochre | Adze | % adze | Smooth surface | % smooth surface | Possible tool | % possible tool |
|----------|---------------|-------|---------------|----------|-------------------|--------|-------|--------|----------------|-----------------|-------------|---------------|--------------|----------------|------|--------|---------------|----------------|--------------|----------------|------------------|
| 2        | 11            | 1     | 5             | 4         | 20                | -      | -     | -      | -              | -               | -           | -              | -             | -               | 1   | 25     | -              | -              | -            | -              |
| 6        | 12            | 6     | 3              | 50        | 1                 | 17     | -     | -      | -              | -               | -           | -              | -             | -               | 1   | 100    | -              | -              | -            | -              |
| 22       | 12            | 32    | 9              | 1         | 3                 | 1      | 100   | -      | -              | -               | -           | -              | -             | -               | 1   | 5      | -              | -              | -            | -              |
| 1        | 13            | 13    | 5              | 38        | 1                 | 8      | -     | -      | -              | -               | -           | -              | 1             | 100             | -   | 1      | -              | -              | -            | -              |
| 4        | 103           | 12    | 12             | 21        | 20                | 14     | 67    | 1      | 5              | -               | -           | 4              | 1             | -               | -   | 1      | -              | -              | -            | 5              |
| 8        | 14            | 37    | 4              | 11        | 13                | 35     | 9     | 69     | 1              | 8               | -           | 1              | 8             | 1                | 1   | 8      | -              | -              | -            | -              |
| 20       | 14            | 31    | 6              | 19        | 10                | 32     | 8     | 80     | 2              | 20              | -           | -              | -             | -               | -   | -      | -              | -              | -            | -              |
| 15       | 18            | 14    | 4              | 22        | 6                 | 33     | 1     | 17     | -              | -               | -           | 1              | 17            | 2                | 33  | 2      | 33             | -              | -            | -              |
| 16       | 15            | 12    | 2              | 17        | 4                 | 33     | 1     | 25     | 2              | 50              | -           | -              | -             | 1                | 25  | -      | -              | -              | -            | -              |
| 3        | 16            | 34    | 13             | 38        | 6                 | 18     | 3     | 50     | 1              | 17              | -           | 1              | 17            | -                | -   | -      | -              | -              | -            | -              |
| 23       | 16            | 11    | -              | -         | 2                 | 18     | 1     | 50     | -              | -               | -           | -              | -             | -                | -   | 1      | 50             | -              | -            | -              |
| 25       | 16            | 51    | 7              | 14        | 26                | 51     | 1     | 89     | 1              | 4               | -           | 2              | 8             | 1                | 4   | 15     | -              | -              | -            | -              |
| 7        | 18            | 5     | 1              | 20        | 1                 | 20     | -     | -      | -              | -               | -           | 1              | 100           | -                | -   | -      | -              | -              | -            | -              |
| 12       | 18            | 205   | 44             | 21        | 28                | 14     | 13    | 46     | 4              | 14              | 2           | 7              | 1             | 4                | 3   | 11     | 2              | 7              | 3            | 11             |
| 14       | 18            | 17    | 2              | 12        | 8                 | 47     | 2     | 25     | -              | -               | -           | 2              | 25            | -                | -   | 4      | 50             | -              | -            | -              |
| 13       | 19            | 22    | 4              | 18        | 12                | 55     | 9     | 75     | 2              | 17              | -           | 1              | 8             | -                | -   | -      | -              | -              | -            | -              |
| 18       | 20            | 19    | -              | -         | 5                 | 26     | 2     | 40     | -              | -               | -           | -              | -             | -                | -   | 3      | 60             | -              | -            | -              |
| 19       | 20            | 20    | 1              | 5         | 6                 | 30     | 3     | 50     | -              | -               | -           | -              | -             | 2                | 33  | 1      | 17             | -              | -            | -              |
| 9        | 4             | 4     | -              | -         | -                 | -      | -     | -      | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |
| 11       | 4             | 1     | 25             | 1         | 25                | -      | -     | -      | -              | -               | -           | -              | -             | 1                | 100 | -     | -              | -              | -            | -              |
| 17       | 10            | -     | 3              | 30        | 3                 | 100    | -     | -      | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |
| 24       | 5             | -     | -              | -         | -                 | -      | -     | -      | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |
| 26       | 2             | -     | -              | -         | -                 | -      | -     | -      | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |
| 27       | 2             | 2     | -              | -         | 1                 | 50     | 1     | 100    | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |
| 28       | 1             | 1     | -              | -         | -                 | -      | -     | -      | -              | -               | -           | -              | -             | -                | -   | -      | -              | -              | -            | -              |

Table 10.2
LBK finds per yard from oldest (yard 2) to youngest (yard 19) yard.

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8 Gomart et al. 2015
9 Hachem & Hamon 2014; Gomart et al. 2015
If the dating on the basis of the different pottery phases is taken into account (Table 10.2), no structure or pattern can be observed in tool use and activities represented between the yards. Therefore it can be concluded that the role of stone tools did not change over time in the Cannerberg settlement.

10.3.2 Detailed analysis of five yards and four pits

Based on the results of the features, structures and the analysis of the pottery, five yards and four pits were selected for a detailed analysis of the material by the excavator, allowing a further interpretation and comparison between the different yards and the pits.

A total of 452 stone artefacts are connected to these five yards and pits (Table 10.3). Most of these are unworked pieces of stone that do not show any traces of modification other than fractures or traces of heating. A total of 75 artefacts do show traces of modification or use and are classified as tools (17%).

<table>
<thead>
<tr>
<th>houses</th>
<th>8</th>
<th>9</th>
<th>13</th>
<th>12</th>
<th>23</th>
<th>N</th>
<th>%</th>
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<td>4</td>
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<td>1</td>
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<td>100</td>
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<table>
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<th>2080</th>
<th>N</th>
<th>%</th>
</tr>
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<td>100</td>
<td>4</td>
<td>100</td>
<td>21</td>
<td>100</td>
</tr>
</tbody>
</table>

**Raw materials**

Previous analyses of LBK finds from the Netherlands have shown that raw materials were mainly collected close to the settlements. They could be found along the river Meuse or in outcrops where the river deposited stone materials. There are however some exceptions. For the Cannerberg greenish quartzitic sandstone was used that has not previously been found in LBK settlements in the Netherlands.

This raw material is probably locally available, but more research is needed. The ochre and the raw materials of the adzes (the amphibolites, lydites and siliclastic rocks) were not available in de gravel deposits or secondary stone deposits of the river Meuse and had to be imported. Up to date it is still uncertain where exactly these raw materials can be found. A recent sourcing study has shown that the oolitic ochre of the Dutch (Graetheide) and Belgium (Hesbaye & Dendre) LBK had been extracted from a source in the region of Namen. The same study also notes a high likelihood that the compact ochre category has its source in Germany, although those results will be published separately. The exact provenance of all of the adzes is still unclear, despite extensive research. Recent research has shown a possible source for the amphibolite at Jistebsko in the Czech Republic where Neolithic quarries were found. Further petrographic research will have to be done to test this hypothesis. The basalt is believed to originate from the Eifel region, while the lydite has been sourced to Céroux-Mousty in Belgium. The other raw materials that were frequently used in the

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10 Verbaas 2014.
11 Verbaas 2014, 520-521; Wijnen 2014, 474-475; Verbaas in press.
12 Goemaere et al. in press.
13 Bakels 1987 amongst others.
14 Ramminger & Šída 2012.
15 Bakels 1987, 68.
Cannerberg were probably obtained from areas closer to the settlement such as the Meuse valley or other stone outcrops\textsuperscript{16}.

This general pattern of local and exotic raw materials holds true for the Cannerberg (Table 10.4). The materials found are comparable to those from other LBK sites in the Netherlands, indicating a similar use of their surroundings for stone acquisition and similar exchange patterns. Sandstone, quartzite and vein quartz are most commonly found. When we compare the percentages between the yards and the pits it becomes clear that the percentage of quartzite found in the pits is much higher than for the yards, whereas in yard 12 and pit 700/1980 a large quantity of vein quartz is present. This presence is difficult to explain as vein quartz is in general unsuitable for tool use. It can be used as temper for pottery, but this seems not to be the case for the LBK. Where if quartz is found in pottery it generally is as rounded sand particles\textsuperscript{17}.

<table>
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<th>8</th>
<th>9</th>
<th>12</th>
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<th>23</th>
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<th>%</th>
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</table>

**Typology**

The range of tool types found at Maastricht Cannerberg is very similar to what is commonly found in the Dutch LBK. An extensive description of the different tool types can be found in previous publications\textsuperscript{18}.

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\textsuperscript{16} Amkreutz 2007; Bakels 1978.

\textsuperscript{17} See for example Van de Velde 2014, 499.

\textsuperscript{18} See for example Verbaas 2014.
Special finds include a grinding stone with a groove from house yard 8 and two peculiar querns from yard 12 (Figure 10.1). The first quern is complete and unbroken, which is rare for the Dutch LBK. The second quern consists of three heated quern fragments and 11 heated fragments of stone of the same raw material. In this yard, two heated grinding stones were found also. The heated querns and grinding stones are the only heated tools retrieved from these five house yards.

When we compare the material from the different contexts there is no substantial difference in the typological composition (Table 10.5). All tool types were discarded in both the pits and the yards. It can therefore be concluded that the pits were used to discard the same household waste as the pits that could be connected to the yards.

### 10.4 LBK use wear study

#### 10.4.1 Red ochre

Pieces of red ochre are a frequent find in Dutch LBK assemblages. Bakels and Wijnen classified four different types of ochre for the Dutch LBK. The oolithic ochre probably originates from the region of Namen (Belgium). For the clastic ochre the extraction point remains unclear but it is believed to be from the Eifel (Germany).

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19 Amongst others Van Gijn & Verbaas 2009.
20 Bakels 1979; Wijnen 2014.
21 Bakels 1979; Wijnen 2014.
For the Maastricht Cannerberg assemblage a total of 23 pieces of red ochre were recovered (Figure 10.2). They range from very small fragments to larger blocks of up to 7.8 cm in length. The percentage of ochre for the site overall is 1.8%, but they represent 8% of the tools. Compared to other Dutch LBK sites this percentage is average, even though percentages vary highly between sites\textsuperscript{22}. Most of the Cannerberg materials are of the oolitic type of ochre (N=19), the type most commonly found in the Netherlands. Fifteen pieces fall in the oolitic 1 category (the grain supported type), whereas only four fall in the matrix supported oolitic type. Only four pieces can be classified as the compact variety, three clastic 1 and one clastic 2. When we compare the Cannerberg assemblage with the other Dutch sites\textsuperscript{23} it becomes

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure10.3.png}
\caption{1) Old fracture with weathered ooliths on V1039. 2) Fracture with fresh and unweathered ooliths on V1039. 3) Ground facet with relatively wide striations on V879. 4) Ground facet with relatively narrow striations on V198. 5) Ground facet without striations on V1201.}
\end{figure}

\textsuperscript{22} Verbaas 2014.
\textsuperscript{23} Wijnen 2013, 81; Wijnen 2015.
clear that oolitic ochre generally makes up most of the assemblage even though the clastic types are present in high numbers as well.

For the Cannerberg site we can see that there is a much higher percentage of oolitic ochre than was seen at the other Dutch LBK sites studied by Wijnen and Elsloo Riviusstraat. In general there seems to be a slight preference for the oolitic ochre in the Dutch Caberg sites24.

Apart from a short use-wear analysis of some pieces of ground ochre performed by Wijnen25, previous wear traces analysis in the Netherlands has always excluded the ground pieces of ochre. To start filling in this gap a low power analysis of the ground pieces of ochre was performed. All the pieces of ochre were studied with a Leica stereomicroscope with magnifications up to 64x. For now analysis with higher magnifications is postponed to a later date, when experimental reference material will be available.

During the analysis five different kinds of surfaces were detected (Figure 10.3):

1. Old fractures with weathered ooliths. These fractures were probably already present during the LBK occupation when the pieces of ochre were ground. These are therefore considered as the original outer surface;
2. Fractures with fresh and unweathered ooliths and unweathered locations were ooliths were extracted from the matrix. These might either be fractures that came to be during the LBK or post depositional breaking of the pieces;
3. Ground facets with relatively wide striations;
4. Ground facets with relatively narrow striations;
5. Ground facets where no striations were visible.

The ground facets with striations are probably the result of grinding on a stone surface, where the difference in the width of the striations is caused by the coarseness of the grinding stone used. In some cases the striations are not only formed on the higher parts of the topography, but also on the lower parts. This indicates the use of another tool than a grinding stone, like a flint blade or similar type of tool of another raw material. However, in previous use-wear analyses of flint from the Dutch LBK no traces from grinding ochre were found. It is also unclear how to explain the ground surfaces without striations for now. An experimental program in which different methods are used for grinding the pieces of ochre is planned in the near future.

When we look at the amount of ground surfaces per piece and the extent to which the surfaces were ground, substantial differences can be observed. When we disregard the pieces smaller than 2 cm (as these are generally fragments) we see that some pieces do not have ground surfaces and seem unused, whereas other pieces have several ground surfaces and no unground surfaces can be detected. In general the pieces are ground in several directions. When very small spots are ground, we often see only one direction of grinding. Clearly there is a substantial variability in the extent to which the pieces were ground before discard. For an exotic raw material this seems strange. Further research is needed to interpret these differences in the use of ochre.

24 Wijnen 2013, 81-82; Verbaas in press.
25 Wijnen 2013, 64-68.
10.4.2 Adzes

Joost Wijnen

Despite studies of the raw material selection and typology of the adzes of the Dutch LBK\textsuperscript{26} a systematic use wear analysis was never performed. It was therefore decided to study all the adzes found at Maastricht Cannerberg and to analyze a selection for traces of manufacture and wear. A total of 23 adzes were found from LBK context (Table 10.6). It was decided to use Modderman’s typology\textsuperscript{27} that distinguishes between high and flat adzes. Modderman made a more elaborate and extensive typology consisting of six types\textsuperscript{28}, but this also considers length as a relevant variable in the typology. As the length of adzes reduces during its use life, this more extensive typology was not used. Most of the adzes from the Cannerberg are fragments (N=13). The fragments vary from small with only a polished facet showing that it had once been part of an adze, up to large fragments with the entire cutting edge present. Seven adzes were complete, and the shapes ranged from very small and high adzes (Figure 10.4), to broad and flat adzes (Figure 10.4). Finally unfinished adzes and three small lydite (phtanite) flakes were present (Figure 10.4). Because lydite is a chert-like material, it is the only raw material of the adzes found that can be flaked.

![Table 10.6](#)

<table>
<thead>
<tr>
<th>Raw materials and tooltype for LBK adzes.</th>
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<tr>
<td>adze flat</td>
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<td>adze high</td>
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<td>adze fragment</td>
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<tr>
<td>total</td>
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The demonstrated variety of shapes and sizes is common for the LBK. This is also true for the different raw materials used for adze production. All of the amphibolite adzes are in the smaller size range, while the lydite adzes are predominantly larger. The basalt adzes vary greatly in size. Two adzes were only semi-finished and are made from quartzite and a siliciclastic material that is very similar to the quartzite used. In general, amphibolite was the preferred raw material for the early LBK, while the late LBK first has basalt as the prevailing material, and lydite and siliciclastic rocks dominate the raw materials found for adzes in the latest phases of the late LBK in the region\textsuperscript{29}. When we compare this to the data available for Cannerberg, no immediate periodization becomes clear. Unfortunately, most amphibolite adzes were not found together with datable pottery and therefore it is hard to say how these have to be dated.

The microwear study of the adzes had to be mainly limited to the lydite adzes, because all basalts and most of the amphibolites were heavily corroded any previous present use-wear was no longer visible. The lydites were significantly less corroded, with some pieces showing relatively ‘fresh’ surfaces, which is probably due to its mostly crypto-crystalline fabric which it is more thermodynamically stable at room temperature.

\textsuperscript{26} Bakels 1987.
\textsuperscript{27} Modderman 1970, 184.
\textsuperscript{28} Modderman 1970, 184
\textsuperscript{29} Bakels 1987, 69.
The three small complete adzes made of amphibolite (Find nrs. 38, 41, and 351) all have only partially eroded surfaces and patination and could therefore be studied for wear traces. Their cutting edges show a continuous band of domed polish with a directionality perpendicular to the edge. The cutting edges are rounded and only little edge-damage is visible. This is consistent with an interpretation of being used on soft wood or similar plant-like material. No clear traces of hafting could be discerned. The bigger adzes show significantly more edge-damage on the used edge, consistent with the higher amount of force expected when using heavier implements or working harder types of wood. The three lydite flakes show no traces of use other than the polished facets, which are traces of production.
The broken pieces with traces of hafting show distinctive breakage patterns 1-2 cm in the haft, a consistent indicator that the implements broke in their haft during use.\textsuperscript{30}

All lydite adzes with a (partially) intact use edge show traces that can be interpreted as woodworking. Most of these traces are very typical: bright, reticulated polish with a directionality perpendicular to the edge.

\textsuperscript{30} Rots 2010.
The two semi-finished adzes are both made from quartzite, which is less favourable for adzes from a physical point of view, as the material is less flexible. This might be part of the reason why they have never been finished. The first (Find nr. 161, Figure 10.4) has been shaped using a combination of pecking and flaking. The stone consists of bands of coarse, white calcite that run through a darker quartzite matrix. This makes the stone look very unlike the raw material of any of the other adzes found at the site and the bands create possible breaking lines. One side of the artefact has several smoothly polished areas. The other side only has polishing on a single ridge. The manufacture of the artefact had already been in the finishing stage (polishing) when it was decided that it would not be completed. Although there is no clear indication as to why the artefact had not been completed, one of the sides of the artefact is littered with big white calcite and quartz minerals that are hard to polish without them breaking off from the darker matrix. This might have already happened, as one of the flakes seems to remove too much of the object for it to be a viable adze. The importance of this flake is underlined by the fact that the scar of this flake is filled with red ochre.

The other semi-finished adze (Find nr. 167, Figure 10.5) was shaped only by pecking, followed by grinding. One side of the artefact bears a large polished area, while the other side was only pecked. On the side with the polishing a corner was broken off that would make the finishing of the adze impossible. No ochre has been found on this adze.

Although it is known that adzes were brought to settlements both as finished and semi-finished objects\(^3\), the presence of two semi-finished adzes and the fact that they are made from lower-quality materials that are not known to be imported can indicate local production.

10.4.3 Stones with a smooth surface

The Cannerberg site has produced some characteristic LBK tool types in the form of querns, two types of grinding stones and a few hammer stones. A more elusive category is formed by stones with a smooth surface. These tools are sometimes also described as polishing stones or rubbing stones. These tools are not generally analysed for use wear, even though several of these objects were studied during the use wear analysis of Stein A2 Heidekampweg\(^3\). On some of the tools from this site wear traces of grinding plant material, such as peas were found. To obtain a better insight in this category of tools, all 13 stones with a smooth surface from the Cannerberg site were selected for a full description and use wear analysis.

Two of these do not show any traces of wear and the smooth surface is therefore probably not the result of use, but of natural processes. One of the tools has certainly been used but due to post depositional wear the traces could no longer be interpreted. One small fragment (Find nr. 565, Figure 10.6) shows traces of grinding cereals and can therefore be described as a quern fragment. Six of the tools show traces of contact with plant materials. On two artefacts traces of grinding or sanding wood were seen (Find nr. 507 and 742, Figure 10.6 & Figure 10.7). The wood was ground or polished on the surface of the tools, probably for the manufacturing or finishing of wooden objects. The distribution of the traces shows that one of these tools was probably handheld, whereas the other was used passively. The other four tools were used to grind or crush...
plant materials as they display a granular distribution with reflective polish that forms domed on the top of minerals. In one case these seem to be peas or a similar material (Find nr. 742.5). In the remaining three cases the contact material could not be inferred (Find nrs. 191, 1080.2 and 1080.3).

At a first glance find number 1110 seems to be a half product of an adze (Figure 10.7). However, the artefact not only displays a smooth surface, but also traces of a pounding or polishing motion on both extreme ends. From both sides several flakes were removed. On the flat surfaces no wear traces were present so probably only the extreme ends were used. Both ends seem to have been used as a hammer stone first, and several flakes were struck from the surface. Subsequently, the tool was used as a pounding or polishing stone for an unspecified plant material.

The last two stones with a smooth surface were used to grind an unknown mineral material (Find nr. 742) and to grind a medium hard stone material (Find nr. 799). Of the last tool both sides were used and these traces are probably relate to the maintenance of the stone adzes. This is the first time that traces of grinding, probably to maintain and re-sharpen the stone adzes, have been encountered in an assemblage from the Dutch LBK. These traces have been seen in other, non-Dutch LBK assemblages.

The stones with a smooth surface were used for a wide range of activities and materials. The main activity is grinding which includes the crushing of plant materials, the shaping and finishing of wooden objects, the grinding of an unknown mineral material and the maintenance of the adzes.

Figure 10.7
Several of the stones with a smooth surface (V507, V742, V799 and V1110).

33 See for example Hamon 2014, 246.
The Linearbandkeramik fruits and seeds

Corrie Bakels

11.1 Material and method

During the excavation samples were taken for botanical analysis. Seven of these were selected to shed light on the agricultural practices of the Linearbandkeramik (LBK) inhabitants of the site. Later an additional sample was chosen in the hope that it would provide extra material for AMS dating.

In the laboratory of the Faculty of Archaeology of Leiden University all samples were sieved under gently running tapwater. The finest mesh used was 0.25 mm. The volume sieved was 2 litres per sample. Flotation of larger samples was considered but as the matrix consisted of a sticky loess loam, this had to be abandoned. Residues were air-dried, plant remains manually picked out under a microscope with 6-20 x magnification, and the resulting fruits and seeds identified and counted by Johan Goudzwaard. All remains were charred as is to be expected in a site with a water table far below the present surface.

11.2 Aims

Before the excavation started we had three questions that we wanted answered. The first regarded the kind of crops cultivated by the inhabitants of the LBK settlement. The second was whether special places could be detected within the yards where the occupants would want to dump their agricultural waste. Such practice is postulated by Knörzer and others after him. Knörzer found, for instance, that burned waste consisting of chaff and weeds was deposited in isolated pits north and west of the houses in sites belonging to the Aldenhovener Platte cluster of settlements, Germany. Bakels found that in Schwandfeld and Meindling, both also in Germany, such waste was discarded in pits west of the houses, but that in the Dutch site of Geleen-Janskamperveld no such preference could be discerned. It would therefore be interesting to see what the inhabitants of Maastricht-Cannerberg did with their waste.

The third aim was to discover whether finds dated to an early phase of occupation contained fewer field weeds than those dated to a late phase. When farmers cultivate fields newly cleared from virgin forest they will not suffer from weeds sprung up from a reservoir of weed seeds in the soil, the so-called seed bank. The only source of weeds are seeds brought in with the sowing seed. But if the clearing is used over and over again, weeds will have established themselves in the local soil. The LBK farmers are considered to have cultivated their fields more or less permanently and therefore crops of a late phase of occupation should display more weeds than those of early phases.

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1 Knörzer 1988.
3 Bakels 1995.
11.3 Results and discussion

The results of the laboratory analysis are presented in Table 11.1. Eight samples is not much to go by. Moreover two samples originate from the same feature, as one of these samples is the extra one sieved for AMS material. Also, after the analysis was finished one feature changed from dated to not possible to date and two appeared not to belong to the earliest phase of occupation as was assumed at the time of sample selection.

Five samples (from four features) are very poor in finds, with find densities (remains per litre of sediment) ranging from 0.5 to 2.5. The source of these samples is the infill of long pits dug next to the long walls of houses. In these infills the darkest bands were chosen for the investigation. These pits belong to an earlier phase of occupation than the other three. The absence of much charred material may imply that the inhabitants still produced clean crops at that time and had therefore not much waste to discard.

The sparse remains show that they grew at least emmer and/or einkorn wheat (Triticum dicoccum Schübl. and/or Tr. monococcum L.). One of the most common LBK weeds, lamb’s quarters (Chenopodium album L.) is present as well, but with only one specimen. Gathered fruits and nuts are conspicuously absent, but in the slightly later pit 640 fragments of hazelnut (Corylus avellana L.) were found.

The three remaining samples show high densities. Two of these are dated to a late phase in the occupation, the third is not dated. The finds consist mainly of cereal chaff (spikelet bases and glume bases) of Triticum and the usual suite of LBK field weeds. The kind of weeds points towards a harvesting high or midway on the stalk.5 As the few identifiable cereal grains belong to emmer wheat, the finds represent charred waste from the dehusking of emmer wheat. The finds bring also a second crop plant, linseed/flax (Linum usitatissimum L.).

The fact that this waste is attributed to a later phase supports the hypothesis that later fields were weed infested. However, the source of the earlier and later samples is not the same. The younger pits are not of the type long pit alongside a house. One is a west pit and may perhaps be considered as support of the model presented by Knörzer in which such waste consisting of chaff and weeds is deposited in west pits rather than in the longish pits. The second represents waste dumped in an abandoned silo. The third sample, without date, comes from a pit filled with flint debris. It could be that the place of discard explains the relative ‘richness’ of the finds rather than the date.

To conclude, the answer to the first question is that the LBK farmers of Maastricht-Cannerberg cultivated in any case two of the seven crop plants known at that time in Western Europe, emmer wheat and linseed/flax.6 Einkorn wheat may have been grown too, but as there are no grains and the chaff remains were too fragmented to allow einkorn chaff identification, this is not certain. Barley and lentil were not expected, because barley is near absent in Dutch LBK contexts, and lentil seems to have been grown only during the early phases of the LBK in the Netherlands, phases which are not present in Maastricht-Cannerberg. What remains is pea and poppy seed. They may have been cultivated, but as remains of them are not found as often as those of wheat, their absence may be attributed to the small number of samples.

5 Bakels 2009, 39.
6 Bakels 2009, 30.
The two other questions raised cannot be answered because of on the one hand the limited amount of samples and on the other the disparity in their source.

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**Crop plants**

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**Wild herbs**

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**Density**

| 0.5 | 1.5 | 1.5 | 2.5 | 2.5 | 80.5 | 37.0 | 43.0 |

**Table 11.1**

Seeds and fruits found in the Bandkeramik settlement. N and S pits are the longish pits accompanying the long northern or southern wall of the house. Cf indicates presumably.
Part 3

Dynamics in Iron Age Habitation
The Iron Age habitation

Lucas Meurkens

12.1 Introduction

In addition to the LBK settlement the excavation has also yielded a large number of features dating to the Iron Age. These will be treated in the following chapters.

First of all, a note regarding the dating of the Iron Age features. In some cases it was difficult to assign features to this specific period, as only a selection of the features was sectioned (see methodology). Nevertheless during fieldwork, all features were given a provisional date, mainly based on the texture and colour of the fill. On the loess soils it is usually fairly easy to make a distinction between Neolithic and younger features on the basis of the fill. The fill of the former is usually a compact dark brownfill, whereas younger features dating from late prehistory until the Middle Ages are usually filled with colluvium-like material with a beige-yellow to grey-white colour. The Cannerberg, however, proved to be an exception, since the LBK features were shown to have a rather light-coloured fill. It can therefore not be excluded that a part of the features which were provisionally dated ‘Iron Age’ should in fact be dated to the Neolithic, or the other way round. In addition, when datable finds were lacking, it was difficult to distinguish between Iron Age features on the one hand and features from the Roman Period and Middle Ages on the other. The Cannerberg has also yielded remains from the latter two periods, albeit in small numbers. Consequently, a part of the ‘Iron Age’ features without datable finds could actually be younger.

During fieldwork a total of 409 features were given the provisional date ‘Iron Age’ (Figure 12.1). During post-excavation analysis a further distinction was made between features which securely date to this period (based either on the presence of datable find material or on association; i.e. the location of a feature within a dated structure) and features which possibly date to this period. These features are itemized per type in Table 12.1. In the overview of features in Figure 12.1 only those features and structures which can be securely dated to this period are included.

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Certain</th>
<th>Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posthole</td>
<td>81</td>
<td>145</td>
</tr>
<tr>
<td>Pit</td>
<td>66</td>
<td>111</td>
</tr>
<tr>
<td>Ditch</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

In this chapter the Iron Age features will be discussed. After a description of the features and structures, an attempt will be made to date the features more precisely and put them in broader framework, in which in particular the discussion about Iron Age house plans on the loess soils in South Limburg is important.
Figure 12.1
Overview of features and structures with an Iron Age dating.
12.2 Features and structures

12.2.1 Introduction

The Iron Age features are distributed widely over the excavated area. In the southwestern part of the excavation the features belong to four house plans with associated outbuildings and pits. These appear to represent several different farmyards. In addition there are clusters of pits/postholes with plans of outbuildings in the extreme northeast and southeast of the excavated area. An exceptional find is a wide ditch with a V-shaped cross-section which can be followed over a distance of 165 metres and can probably be dated to the Late Iron Age. Based on the specific location in the landscape, this ditch can possibly be interpreted as part of a fortified settlement. In this section the dating and periodization of the features will briefly be discussed first. Subsequently the different features and structures will be described in more detail.

12.2.2 Dating and phasing of the features

For an accurate dating of the Iron Age features of the Cannerberg, we have to rely almost exclusively on the dating of the pottery (see chapter 13). Analysis of all the diagnostic pottery showed that this material dates between the Early Iron Age and the first half of the Middle Iron Age (between c. 800 and 400 BC). Several complexes could be dated relatively sharply and based on those dates it must be concluded that the area was continually inhabited during this period. The pottery dates of the different analysed contexts are given in Table 12.2.

Although there are no clear indications present in the pottery for habitation in the Late Iron Age, there is another find category which possibly points to habitation in this period. A fragmented slingshot was found in one of the pits (1699). Slingshots can be dated to both the Middle and the Late Iron Age.\(^1\)

Apart from dates based on find material, there was the possibility of dating part of the features with \(^{14}\)C. Ultimately no Iron Age features were dated with \(^{14}\)C, since the chronology of the Iron Age settlement was established reliably through the pottery. Another reason for not using \(^{14}\)C-dating is that precisely during this phase of the Iron Age there is a plateau in the \(^{14}\)C calibration curves. Calibrated, these dates would have had rather a wide range which would not have any added value on top of the pottery dates. Where \(^{14}\)C-datings could possibly have helped was with the dating of the probable Late Iron Age ditch. However, no suitable sample locations for \(^{14}\)C samples could be found in this ditch.

\(^{1}\) Van den Broeke 1987, 38.
A total of five house plans have been reconstructed from the clusters of features (Figure 12.2). Only one of these (house 1) was recognised as such in the field. The other four were reconstructed during the post-excavation analysis. Three of these are in the direct vicinity of house 1 and are very comparable to each other in terms of shape, size and orientation. The reconstruction of the house plans based on the field drawings was problematic as in the field only a selection of the features had been sectioned. Moreover, it turned out that a part of the sectioned features of these structures had been interpreted as a natural disturbance. Nevertheless the strong mutual resemblances between the different plans make the reconstructions seem reasonably reliable. The characteristics of the different plans have been described in detail in the catalogue (appendix 8). We would therefore refer to the catalogue for detailed information. In this section as few general characteristics of the house plans are discussed, whereby house 1 serves as an example.

The house plans are all characterized by a relatively regular spacing in pairs of wall posts. The central post setting is much less clear in the reconstructed plans. Only in houses 1 and 3 are there two probable rows of inner posts but these do not seem to be spaced regularly in relation to each other. In general, the features interpreted as inner posts seem to have been dug in less deep than the wall posts. In house 1, nearly all wall posts had a residual depth of between 10 and 30 cm whereas none of the inner posts was deeper than 10 cm. So it appears that for a large part of the house plans the centre has not been preserved. This probably points to the wall posts and inner posts together
Figure 12.2
House plans of the Iron Age of the Cannerberg.
carrying the roof burden, or possibly that the wall carried most of the roof burden. The width of the houses (the distance between the rows of wall posts) is largely comparable and lies between 6.2 and 6.9 m. Only house 5 deviates from this with a width of 4.7 m. The length of the plans is in most cases unclear. The most complete specimens, houses 1 and 3, have a length of respectively 25 and 19.5 m. No data are available on roof construction and possible entrances for any of the plans.

With the exception of house 5 pits were present inside nearly all house plans. Based on the location and in some cases the orientation of the features (in line with or perpendicular to the axis of the house) it seems that these pits have to be associated with the house plans. In houses 2 and 3 it concerns one pit centrally located in the house plan. There are two pits present in house 4, one of which is large and rectangular and has the same orientation as the reconstructed plan. These ‘built-in’ pits are rectangular in cross-section and can probably be interpreted as store or storage pits. The top of such pits was sealed hermetically so that relatively constant conditions were created with a stable temperature and humidity. Thus perishable wares, such as food, fodder or sowing seeds could be kept for a longer time. In a number of these pits a large quantity of find material was found, mainly pottery sherds and broken stone. After use they were probably filled with household waste, though a ritual function is also possible for some pits (see § 12.2.5. pits (type 6).

Typologically, the house plans of the Cannerberg are difficult to classify. No comparable house plans are known from the Dutch part of the Limburg loess area. A somewhat comparable plan has been known for some time from Neerharen-Rekem in Belgium, just across the Meuse near Maastricht. However, the width of this particular plan is so large (9.75 m) that some have questioned the reconstruction. Recently two unquestionable and comparable plans were found at the excavation Bilzen-Spelverstraat in the Hesbaye area of Belgium, west of Maastricht. In particular Bilzen structure 18 shows strong resemblances with the plans of the Cannerberg, especially in the relatively regular spacing of the wall posts and the irregular spacing of the inner

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3 Hiddink 2014, 193.
Figure 12.4
House plans of the type St-Oedenrode / Oss-Ussen 2.
posts. Furthermore, the reconstructed dimensions of Bilzen structure 18 (19 x 6.5 m) are very comparable with the plans of the Cannerberg as well.

In general, the (Early) Iron Age settlements in the Dutch and adjoining Belgian and German loess areas are characterized by relatively small plans (three or four aisled) which elsewhere would probably have been identified rather as outbuildings. As so far larger buildings have been almost unknown from the loess, it has been suggested that a part of these smaller structures must have functioned as house. Houses 1 to 4 of the Cannerberg and the plan of the Belgian Bilzen show a more nuanced picture. If we make comparisons among sites on the sandy soils in the north of Limburg and in Brabant, there are some parallels. With regard to the irregular central post setting and the regular spacing of the wall posts, there are clear similarities among variants of the house type St. Oedenrode / Oss-Ussen 2. The central posts in these plans are placed in such a way that they are alternately 2, 3 or 4 aisled. This could explain the irregularity of the central post settings in less well preserved house plans, like those found on the Cannerberg. Several examples of this type, amongst others from Lieshout-Beekseweg (structure 62)\(^5\) and Best-Aarle (structures 160 and 223)\(^6\) are very comparable with the houses of the Cannerberg, both with regard to size and the paired placing of wall posts. The wall posts in these plans probably had a roof-bearing function as well. The plans of Neerharen-Rekem and Bilzen-Spelverstraat, as well as a short specimen with similar characteristics excavated in Nieuwstadt-Sittarderweg\(^7\), indicate that St. Oedenrode Oss-Ussen 2 type is not confined to the sandy soils but also occurs more to the south on the loessic soils of South-Limburg and adjacent regions of Belgium. This indicates that contrary to recent opinion regularly sized house plans do occur in these regions.\(^8\)

House plans of the type St.Oedenrode / Oss-Ussen 2 (Figure 12.4) and comparable types from the eastern part of the Netherlands are dated in the period between the Late Bronze Age and the first half of the Middle Iron Age. The number of plans that can be placed with reasonable certainty in the Late Bronze Age is however limited. Based on associated pottery types, most specimens can probably be dated to the Early Iron Age.\(^9\) None of the house plans of the Cannerberg could be dated directly with diagnostic pottery or \(^{14}\)C-dates from postholes. The pits found within the plan did in some cases yield enough pottery for them to be dated. On that basis, house 2 could be dated to the first half of the Early Iron Age. Houses 1 and 4 could not be dated more precisely than the Early Iron Age or at most to the beginning of the Middle Iron Age. The pottery from house 3 could not be dated more precisely than 'Iron Age'.

12.2.4 Outbuildings and granaries

In addition to the house plans 22 outbuildings were documented. It concerns three larger outbuildings and 19 smaller outbuildings or granaries (Dutch: spiekers). Outbuildings 1 and 2 have six posts and are relatively large compared to the granaries; they were therefore classified separately. They have been described in more detail in the catalogue. The larger outbuildings are situated somewhat isolated from the other Iron Age structures. The dating of both outbuildings is mainly based on the fill of the postholes. A silo pit near outbuilding 1 has been dated to the second half of the Early Iron Age based on pottery. The interpretation of outbuilding 3 is unclear.

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\(^5\) Hiddink 2014.
\(^6\) Tol, Meurkens & Verspay in prep.
\(^7\) Bink 2004.
\(^8\) See Hiddink 2014 for a summary of the discussion.
\(^9\) Hiddink 2014, 177-178.
As the structure consists of two rows of 5 posts, we could be dealing with one large outbuilding or with several smaller granaries that were built in line.

The smaller outbuildings consist of 4-, 6-, 8- and 9-poster granaries. These structures are usually interpreted as storage places for harvests and are a frequent occurrence on late prehistoric settlement sites. On the Cannerberg, the granaries seem to occur in the vicinity of the house plans, which is contrary to the large outbuildings. A large part of these structures (N=15) was recognized in the field and the interpretation could be confirmed by sections in most cases. The sizes and characteristics of the different granaries are given in Table 12.3. Three granaries yielded pottery. Based on this, two could be dated to the Late Bronze Age / Early Iron Age (quartz-tempered pottery). A third granary yielded pottery that could not be dated more accurately than Iron Age.

### 12.2.5 Pits

A total of 177 pits have been dated to the Iron Age based on the fill and/or finds recovered from these pits. They are distributed widely over the excavated area (Figure 12.5).

A total of 66 pits could be dated to the Iron Age with certainty based on sectioning. For the other 111 pits a date in the Iron Age is probable. These pits were dated on the basis of the fill but here the interpretation was not checked through sectioning. During the mechanical levelling of the excavation area, the upper levels of some of these pits yielded Iron Age pottery, but because of the small quantities we could hypothetically be dealing here with intrusive material.

The sectioned pits can be divided into several different types, which will be discussed in more detail below (Table 12.4).

<table>
<thead>
<tr>
<th>granary</th>
<th>structure</th>
<th>N posts</th>
<th>orientation</th>
<th>length (in m)</th>
<th>breadth (in m)</th>
<th>post depth (cm)</th>
<th>finds</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>46</td>
<td>4</td>
<td>NNO-ZZW</td>
<td>3.1</td>
<td>3.1</td>
<td>unknown</td>
<td></td>
<td>one post missing</td>
</tr>
<tr>
<td>2</td>
<td>59</td>
<td>4</td>
<td>N-Z</td>
<td>3.5</td>
<td>2.9</td>
<td>unknown</td>
<td></td>
<td>one post replaced</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>4</td>
<td>N-Z</td>
<td>2.6</td>
<td>2.5</td>
<td>32-35</td>
<td></td>
<td>one post replaced</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>4</td>
<td>N-Z</td>
<td>2.6</td>
<td>2.5</td>
<td>12-21</td>
<td></td>
<td>one post missing</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>4</td>
<td>NW-ZZO</td>
<td>3.1</td>
<td>2.9</td>
<td>1-5</td>
<td></td>
<td>one post missing</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>4</td>
<td>NW-ZZO</td>
<td>3</td>
<td>2.2</td>
<td>2-4</td>
<td>1 sherd quartz-tempered pottery in S1547 (BRONSL-IJZV)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>32</td>
<td>4</td>
<td>NW-ZO</td>
<td>3</td>
<td>2.5</td>
<td>9-26</td>
<td>one post replaced</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>26</td>
<td>4</td>
<td>NNO-ZZW</td>
<td>2.9</td>
<td>2.6</td>
<td>12-22</td>
<td>one post replaced</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>50</td>
<td>4</td>
<td>O-W</td>
<td>1.9</td>
<td>1.5</td>
<td>unknown</td>
<td>one post missing</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>58</td>
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<td>NW-ZO</td>
<td>1.7</td>
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<td>unknown</td>
<td>one post missing</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>56</td>
<td>4</td>
<td>NO-ZW</td>
<td>2.9</td>
<td>2.6</td>
<td>11-12</td>
<td>3 sherd quartz-tempered pottery in S2190</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>4</td>
<td>NO-ZW</td>
<td>1.9</td>
<td>1.9</td>
<td>2-22</td>
<td>one sherd iron age pottery</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>25</td>
<td>4</td>
<td>N-Z</td>
<td>3.8</td>
<td>3.5</td>
<td>12-27</td>
<td>1 sherd quartz-tempered pottery in S2190</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>8</td>
<td>6</td>
<td>NO-ZW</td>
<td>2.8</td>
<td>1.6</td>
<td>13-25</td>
<td>one post missing</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>7</td>
<td>9</td>
<td>NO-ZW</td>
<td>3.3</td>
<td>2.9</td>
<td>9-21</td>
<td>one sherd quartz-tempered pottery</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>51</td>
<td>4</td>
<td>O-W</td>
<td>2.7</td>
<td>2.5</td>
<td>unknown</td>
<td>one sherd iron age pottery</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>29</td>
<td>8</td>
<td>NNW-ZZO</td>
<td>4.9</td>
<td>2.6</td>
<td>8-20</td>
<td>one post disrupted by younger ditch</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>52</td>
<td>8</td>
<td>NO-ZW</td>
<td>4.9</td>
<td>2.7</td>
<td>unknown</td>
<td>presumably 6- or 8-posts, partially outside excavated area</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>55</td>
<td>&gt;4</td>
<td>WNW-OZO</td>
<td>unknown</td>
<td>3.8</td>
<td>10-36</td>
<td>one post disrupted by younger ditch</td>
<td></td>
</tr>
</tbody>
</table>

Table 12.3
Characteristics of the Cannerberg granaries.
Figure 12.5
Distribution of the different types of pits on the Cannerberg.
Table 12.4
Type and number of Iron Age pits on the Cannerberg.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pit with bowl-shaped cross-section</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Pit with straight walls and flat bottom</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Pit with sloping walls (45 degrees) and flat bottom</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Pit with irregular cross-section</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Loam-extraction pit (complex)</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Pit within house plan</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Other type</td>
<td>2</td>
</tr>
</tbody>
</table>

Type 1 – *Pits with a bowl-shaped cross-section*
A total of 16 specimens were found of this type of pit. These pits are relatively shallow with a residual depth of less than 46 cm. One pit of this type (742) with a residual depth of 68 cm was considerably deeper. The precise function of these pits is unclear.

Type 2 – *Pits with straight walls and flat bottom*
This type of pit is represented by 14 specimens. On average the pits of this type are deeper than pits with a bowl-shaped cross-section. The residual depth lies usually between 50 and 70 cm with a few exceptions higher and lower (866, residual depth 90 cm; 2084, residual depth 22 cm). Pits with a rectangular cross-section are usually interpreted as silo or storage pits. The tops of such pits were hermetically sealed thereby creating relatively constant conditions with a stable temperature and humidity. Thus perishable wares such as food, fodder and sowing seeds could be kept for longer periods. A striking representative of this type is pit 866. The walls of this pit were covered with a layer of white loam (Figure 12.6).

Type 3 – *Pits with sloping walls and a flat bottom*
This type of pit is represented by 3 specimens (389, 501, and 779). The pits have sloping walls (angle of inclination about 45 degrees) and a flat bottom. Pit 389 was relatively large (maximum length 3 m), the other pits of this type were smaller (length c. 1.5 m). The residual depth is comparable to the pits with a rectangular cross-section. Although given their shape these pits seem to have had a specific function, it is not clear what this function was exactly. Perhaps they also have a store / storage function.

Type 4 – Pits with an irregular cross-section

These pits are characterized by an irregular cross-section. The residual depth of the different specimens varies from 16 cm (790) to 90 cm (221/2140). The deeper specimens of this type could possibly be interpreted as loam extraction pits (type 5).

Type 5 – Complexes of loam extraction pits

Different clusters of pits have been documented in the excavation which can probably be interpreted as loam extraction pits. These complexes have come to light at different excavations of Iron Age settlements, such as for instance in Sittard – Hof van Limburg\textsuperscript{11} and Sittard-Hasseltsebaan.\textsuperscript{12} The clusters are characterized by different intersecting pits, which give them an irregular shape on the surface. The lowermost fills of the pits are in general clean and difficult to recognise. There are also often lumps of ‘clean’ loess in these fills. The secondary fill (Dutch: nazak) of these pit complexes is frequently very rich in find material. Possibly these complexes were filled in after use with settlement waste or the remaining depression has functioned as artefact trap.

A total of 5 possible complexes of loam extraction pits have been identified. These can be described as follows:

\textit{Loam extraction pit complex 1}

This complex consists of 7 pits (1517/1518, 1521, 1534, 1539, 1540, and 1541). Most of them are relatively shallow (5-25 cm). Pits 1517/1518 are two connected pits with a maximum depth of 94 cm and a clean homogeneous fill. Several fills could be distinguished in pit 1534, which had a remaining depth of 1.0 m. The lowermost fills (2, 3, and 4) are relatively clean and seem to have resulted from a quick filling in of the pit. The secondary fill (fill 1) is darker with find material (mainly pottery and stone). The pottery of S1534 can be dated to the Early Iron Age.

\textit{Loam extraction pit complex 2}

This complex consists of 5 pits. The interpretation is uncertain since not all of the pits have been sectioned. Pit 1714 has not been sectioned but appears to consist of different pits which intersect each other. Pits 1710, 1723, and 1716/1718 were sectioned. The residual depths were respectively 24, 38, 22 and 14 cm. During the mechanical levelling of the excavation area and sectioning, a total of 16 pottery sherds were found. They could not be dated more accurately than ‘Iron Age’.

\textit{Loam extraction pit complex 3}

Pits 201, 1921, 1922, 1923, and 1924 probably form a loam extraction pit complex. The cluster has been sectioned and appears to consist of several intersecting pits (Figure 12.7).

The whole complex has an irregular cross-section. The residual depths of the pits are respectively 148, 50, 67, 104, and 96 cm.

In the case of 201, the primary fill of the pit has been filled mainly with ‘clean’ loess. The secondary fill at the top of the pit was rich in find material (mainly pottery and stone). The pottery could be dated rather sharply in the first half of the Early Iron Age.

\textsuperscript{11} Van Hoof et al. 2014.
\textsuperscript{12} Rondags 2015.
Loam extraction pit complex 4

A possible loam extraction pit complex is located in excavation pit 52 but it was not recognised as such in the field and therefore not investigated. It seems that we are dealing with several overlapping pits (S524, 525, and 526). The features were dated on the basis of the colour and texture of the fill. No find material was found.

Loam extraction pit 444

The last possible loam extraction pit is pit 444. On the surface this pit has an irregular shape and a diameter of nearly four meters. The cross-section is rather irregular as well with residual depth of 174 cm (Figure 12.8).

Lumps of clean loess are visible in the oldest fill which would indicate that the pit was filled up soon after having been dug. Subsequently the pit was probably used as
refuse pit. Halfway the fill of the pit there is a 10-15 cm thick charcoal-rich layer. Above it is a brownish secondary fill. In particular the charcoal-rich layer and the secondary fill yielded a large quantity of find material among which a 231 sherd of hand-made pottery. In addition 15.7 kg stone (242 pieces), 1.1 kg flint (42 pieces) as well as burnt loam and charcoal were recovered from the pit.

Type 6 – Pits inside house plans

With the exception of house 5, the interior of all house plans yielded one or more pits. In all cases it concerned pits with a bowl-shaped cross-section or with straight walls and a flat bottom. This latter type of pit should probably be interpreted in the same way as the pits of this type outside the house plans, i.e. as silo or storage pits.

The pits inside house 2 (918 and 1140) were striking because of the nature of the finds recovered from them. Pit 1140 had a bowl-shaped cross-section and a residual depth of 37 cm. A large quantity of pottery had been deposited in the pit, mainly deriving from two large pots. The material was deposited in the pit in a structured manner: first, the bottom and walls of the pit were covered with large wall sherds. Subsequently, the other pieces of the two pots were deposited in the pit (Figure 12.9). Because of the structured deposition of material, it appears that we are not dealing here with a standard refuse pit. A similar structured deposition appears to be present in pit 918. The bottom of the pit yielded two almost complete (miniature) pots. One of these was placed upright in the centre of the pit. The other was lying upside down at the edge of the pit (Figure 12.9). Because of the structured deposition of material, it appears that it does not represent a standard refuse pit. A similar structured deposition appears to be present in pit 918. The bottom of the pit yielded two almost complete (miniature) pots. One of these was placed upright in the centre of the pit. The other was lying upside down at the edge of the pit (Figure 12.10).

Both of these pits should probably be interpreted in the same way as pit 2271 described below, i.e. in a ritual context. The structured depositions should possibly be interpreted as foundation deposits or they were made as part of abandonment rituals.
Figure 12.9
Pit 1140 inside house 2. Top: view from above with partly cleaned sherds. Bottom: Cross-section showing wall sherds at the edges of the pit.
Type 7 – Other pits

Based on the finds encountered in them, two pits fall outside the categories described above. They are described here separately.

Pit 2271 has a rectangular cross-section and a residual depth of 70 cm (Figure 12.11).

The pit differed from the other pits of this type by the huge quantity of find material. The oldest (primary) fill of this pit was relatively clean and contained hardly any finds. The youngest fill consists almost entirely of finds and should be interpreted as a dump. The find material from this layer consisted almost entirely of lumps of burnt daub (a total of 2.8 kg but not all this material was collected). In addition a small quantity of sherds (not burnt) of hand-made pottery was present (N=22). This pottery could not be dated more accurately than ‘Iron Age’. This kind of pits with dumps of large quantities of find material is also known from other Iron Age settlements on the loess.\footnote{Van Hoof 2002, 84-87} They are associated by Van Hoof with abandonment rituals that were carried out when leaving a house. Pit S2271 lies relatively isolated at the edge of the area in which the different Early Iron Age houses (houses 1 to 4) are located.
The second unusual pit (1732) was investigated at the far eastern side of the excavated area. The pit was remarkable because of the objects that were found within it. On the surface the pit has a rounded shape measuring 2.5 x 1.65 m. Its residual depth was c. 15 cm. The pit was investigated in four segments. In the northwestern segment of the pit a group of 15 largely complete loom weights was found. The weights were forming a row. It therefore looks like the weights mark the location of a loom. In the southeastern segment a complete quern was found lying against the edge of the pit; the lower part was made of vesicular lava and the hand held, upper part was made from a quartzite pebble. The shape of the loom weights and the small quantity of pottery found within the pit point to a date in the first half of the Early Iron Age.

It is not entirely clear how this pit should be interpreted. From the Netherlands no comparable pits from this period are known to the author. A comparable pit with a row of loom weights in situ was excavated in Hafnerbach in Austria (Figure 12.13).\(^\text{14}\)

As far as the interpretation is concerned, on the one hand we can think of a functional interpretation, whereby the pit can be interpreted as a kind of sunken-floor hut (Grubenhäus). These huts are interpreted as small workplaces with a deepened floor level. In this case a loom and a millstone would have been set up there. A problem with this interpretation is that no clear postholes of the building itself have been found and, even more importantly, that in the Netherlands sunken-floor huts are mainly known from the Late Roman Period and Early Middle Ages. No specimens dating from the Iron Age are known to the author. Interestingly though is that the Hafnerbach loom mentioned above, also seems to have been located in a pit.

\(^{14}\) Preinfalk 2003.
Another possible interpretation is that the finds can be interpreted as a special (ritual?) deposition. Such depositions of several loom weights are known but it then concerns rather small pits in which the weights were deposited in a more disorganized manner. These pits are known from Udenhout\textsuperscript{15} and Twello\textsuperscript{16} and also date to the Early Iron Age. How such depositions should be interpreted is unclear but possibly they are – like the other structured depositions are thought to be – related to foundation deposits or abandonment rituals.

12.2.6 Settlement structure in the Early and Middle Iron Age

Some remarks can be made on the settlement structure in the Early and Middle Iron Age. The most certain statements can be made concerning the well delimited features in the southwestern part of the research area. Clusters of features and structures from the Iron Age have also been found in the northeastern and southeastern part of the research area but here they are located near the edge of the research area and it is not clear what these features actually represent.

Four house plans have been investigated in the southwestern part of the research area. The plans seem to be part of four farmyards of limited size whereby some granaries and pits are lying within a radius of c. 30 m around the house (Figure 12.14).

Based on pottery types, all these farmyards can probably be dated to the Early Iron Age to (at most) the beginning of the Middle Iron Age. It is not possible to date the different farmyards more accurately but based on the pottery sequence in can be stated that the occupation does probably cover the entire Early Iron Age. House 2 with pottery dating from the first half of the Early Iron Age appears to be one of the earliest houses.

From the perspective of Early Iron Age settlements investigated elsewhere, it is unlikely that in this period several houses would have existed at the same time. Such settlements of several contemporary houses from the Early Iron Age are in fact not known in these regions. In general the settlements consist of isolated farmyards.

\textsuperscript{15} Verbeek & Mostert 2012, 42.
\textsuperscript{16} Meurkens 2014, 152-153.
Figure 12.14
Reconstruction of farmyards from the Early and Middle Iron Age.
which are thought to represent a settlement system of wandering farmsteads. In this settlement system, the settlements move once in a while in order to let the fields regenerate. This specific settlement system was reconstructed based on data from the Brabant sandy soils and it is still debatable to which degree this applies to the fertile loess soils. In any case, on the Cannerberg the habitation appears to have remained on the same spot for a longer time. This implies that there was no need for moving the settlement because of exhausted fields.

As said earlier, most of the other Early Iron Age features were found partly near the edge of the research area thus making them difficult to interpret. The cluster of features in the northeastern part of the area seems in any case to represent a farmyard, consisting of a house, several outbuildings and loam extraction pits. Also in this northern part is a striking cluster of silos or storage pits. Such a remarkable clustering of pits has not been found with the farmyards in the southwest of the research area.

Based on the pottery from this cluster, it could be argued that several habitation phases are represented here. The features in the northern part of the research area thus do not represent one single phase of habitation. For instance, there are several pits dating to the second half of the Early Iron Age to at most the beginning of the Middle Iron Age. Other pits seem to date at the earliest to the beginning of the Middle Iron Age.

It is also remarkable that the larger outbuildings 1 and 2 are not located in the vicinity of the house plans but rather isolated (in the case of outbuilding 1 this is, however, not entirely clear). Possibly these outbuildings had a special function which is why they were positioned separate from the rest of the habitation.

12.2.7 A ditch from the Late Iron Age

The excavation has yielded one ditch which could be securely dated to the Iron Age. It concerns a rather wide ditch (width 1.4 – 2.9 m) which could be followed over a length of 165 m in the southeastern part of the research area (see Figure 12.1 for the location of the ditch).

The ditch is orientated north-northwest – south-southwest and has an irregular course. The ditch was sectioned at three separate points, which showed that the residual depth of the ditch lies between 1.0 and 1.3 m and that the ditch is two-phased. The oldest phase of the ditch is V-shaped and seems to have been filled in rather quickly (clean silty layers at the bottom). After infilling of the oldest phase, the ditch was dug out again. This younger phase is also V-shaped in cross-section but was dug out less deep.

Based on pottery analysis, the ditch cannot be dated more accurately than 'Iron Age'. As said earlier, no suitable locations for ¹⁴C sampling were present either. However, the ditch can in fact be dated based on intersections with other features. The ditch cuts a pit containing pottery that has been dated to the period between the Early Iron Age and the beginning of the Middle Iron Age (S2500) and is in itself cut by a Roman-period pit dated to the first century AD. On that basis the ditch can roughly be dated to the Middle or Late Iron Age.

Based on comparable ditches that were investigated elsewhere in South Limburg, namely in Itteren-Emmaus,\(^*\) Eckelrade-Putstraat,\(^*\) Gronsveld,\(^*\) Born-Koeweide\(^*\), and Maastricht-Langgoederenzone,\(^*\) a date in the second half of the Middle or the Late Iron Age seems most likely. The external characteristics of the ditches at these sites are in fact highly comparable. It always concerns relatively wide and deep ditches with a V-shaped cross-section. When dated, the ditches can be placed in the second half of the Middle Iron Age or in the Late Iron Age. In Itteren, Gronsveld, Eckelrade, and Born we are dealing with square or rectangular ditch structures which are considerably smaller than the ditch of the Cannerberg. The largest specimen is the one of Itteren-Emmaus which has a maximum length of 70 m. With the exception of Eckelrade all these ditch structures are associated with cremation burials and they are interpreted as a cult place or cemetery surrounded by a ditch. At the excavation of Maastricht-Langgoederenzone and the preceding trial trenching campaign,\(^*\) a double ditch with V-shaped cross-section was found that could be followed over a length of minimally 130 m. Based on the presence of one cremation grave between the two ditches, the excavators interpret these ditches as a possible cult place. In view of the great distance over which the ditches could be followed, these do not however seem to be comparable to the ditch structures investigated at the other findspots.

The same applies to the ditch found on the Cannerberg. No cremation graves or other indications were found which would point to it being a part of a cult place. If we plot the location of the ditch on a detailed height map of the Netherlands (AHN2 -Actueel Hoogtebestand van Nederland) another interpretation seems possible, in which the ditch is considered part of a defensive site. When plotted on the map the ditch appears to close off the western side of a narrow spit of land projecting from the Cannerberg, with steep slopes on the northern, eastern and southern side. Defensive works from the Late Iron Age, so-called oppida, are not known in the Netherlands but they do occur in Belgium and northern France. The nearest example can be found on the plateau of Caestert near Kanne, at less than a kilometre from the Cannerberg.\(^*\) Different forms of oppida are known (Figure 12.17).

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*Footnotes:
\(^*\) Meurkens & Tol 2011.
\(^*\) Hensen 2013.
\(^*\) Van Dijk 2009.
\(^*\) Van der Leije in prep.
\(^*\) Hazen & Blom 2015.
\(^*\) Hazen & Blom 2015.
\(^*\) Meurkens et al. 2009.
\(^*\) Verhoeven 2008.
One of these is the so-called *éperon barré* which is defined as a fortification on a high ridge or headland with steep slopes on at least one side. The fortification is closed off at one side by a rampart and ditch but otherwise uses the topography as much as possible. If we are indeed dealing with a fortification on the Cannerberg, it appears to be of this particular type. A rampart may have been present on the eastern side of the ditch but this has left no traces.

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26 Verhoeven 2008, 34.
Conclusion

The Iron Age features on the Cannerberg can be divided into two different complexes / periods: a settlement site that has been occupied continually between the beginning of the Early Iron Age and the first half of the Middle Iron Age (c. 800-400 BC). The settlement features were found scattered over the excavated area. Secondly, a deep ditch with V-shaped cross-section and probably dating from the Late Iron Age. The ditch closes a small spit of land projecting from the Cannerberg. Based on its appearance and location the ditch has been tentatively interpreted as part of a defensive site.
Iron Age finds

The different features and structures of the Iron Age have yielded a considerable quantity of find material. The material can be divided into different categories: hand-made pottery, ceramic objects, burnt loam, stone, and metal. Of these groups burnt loam has not been analysed as the value of the information was limited. With the other categories, a deliberate selection was made of the pieces to be analysed, on the basis of their context.

13.1 Pottery

Lucas Meurkens

13.1.1 Introduction

During the excavation of the Cannerberg, a total of 3860 sherds of hand-made Iron Age pottery were found. Many contexts only contained one or a few undecorated wall sherds without specifically datable characteristics. As it is not very useful to analyse all this material extensively, initially a quickscan was carried out (see appendix 9). During this quickscan a first selection for analysis was made based on two criteria. The most important criterion was the presence of enough diagnostic characteristics (such as form type or decoration) within specific pottery assemblages for them to be dated more precisely. The second criterion refers to the quantity of sherds in a pottery complex. At times, it is still possible to date larger assemblages containing little diagnostic pottery, by looking at the ratio between different technological and typological characteristics (e.g. tempering material and finish). Van den Broeke maintains a minimum of 100 sherds per closed complex for this method to be reliable.

Based on the quickscan, the Iron Age pottery of the Cannerberg was dated roughly to the Early and Middle Iron Age. To sharpen this date further, a second selection was subsequently made whereby a limited number of contexts were selected for further analysis. This selection included the larger pottery assemblages with sufficient diagnostic pieces and those contexts that belonged to recognisable structures. The contexts from which material was analysed are set out in Table 13.1.

In the section below the pottery is described per context.

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1 A part of the contexts has been described under supervision of the author by students of the Faculty of Archaeology at Leiden University as part of the subject Material knowledge Dutch Archaeology. Their reports have been adapted for this article by the author. Features 1140 and 918 have been described by Ronald Huiskamp and Erik Kroon; features 444, 2424 and 221/2140 by Romke-Jan de Vries and Rebecca Wouda; features 201 and 567 by Lasse van den Dikkenberg. And finally feature 389 has been described by Marissa Kollenstart.

2 Van den Broeke 2012, 11-12.
13.1.2 Methodology

From the selected contexts all sherds were analysed (in total 2666 pieces). The material was initially divided into a number of groups of which the most important ones are: hand-made pottery, briquetage (salt containers) and indeterminable fragments.\(^3\) The sherds classified as indeterminable fragments were counted only, and were not analysed. Of the remaining sherds the following characteristics were described:

**Finish** – Description of the surface on the inside and outside.

**Tempering material** – Which kinds of tempering material were added to the clay to ensure that the clay would not crack during firing?

**Shape** – Description of the shape of the pot using, where possible, Van den Broeke’s typology.

**Decoration** – Description of the decoration technique, the motif and the location of the decoration (when retrievable).

When clearly datable diagnostic characteristics are lacking, there are two characteristics in particular that have chronological value. Firstly the tempering material: There are two kinds of tempering which were used only during a limited time period and are therefore suitable for dating; i.e. crushed stone (quartz) and organic material. A (substantial) presence of these types of temper thus gives an indication of the date of a complex. Broken quartz does no longer occur after the Early Iron Age, while organic material as temper is largely limited to the Late Iron Age and Roman Period (Figure 13.1). A second indication of a date is provided by the percentage of sherds with a coarse-textured surface (Dutch: “besmijting”). “Besmijting” is a way of

\(^3\) Grog is classified here as sherds smaller than 2 cm\(^2\) or sherds of which both original surfaces have disappeared.
Figure 13.1
Phasing and chronology of the Iron Age in South Limburg (after: Van den Broeke 2012, fig. 2.10).

Figure 13.2
Percentages of tempering material in dated complexes (A = crushed pottery; B = crushed stone (quartz); C = organic material; D = remainder) (after: Van den Broeke 2012, fig. 3.48).

Figure 13.3
The share of sherds with coarse-textured surface in dated complexes (A = coarse-textured; B = not coarse-textured). (after: Van den Broeke 2012)
finishing whereby the surface deliberately has been made coarse-textured by means of the application of a clay paste. The percentage of coarse-textured sherds forms an indication of the date of a complex (Figure 13.2).

For the description of the pot shape, its decoration as well as certain base and rim types, the typology that Van den Broeke made for Oss-Ussen has been used.\(^4\) This pottery typology is also applicable to the Early and Middle Iron Age of South Limburg. For the dating of the complexes, the pottery phasing of Van den Broeke has also been used where possible (Figure 13.3).

13.1.3 Results

Based on the quickscan, a total of 3860 sherds of hand-formed pottery were dated to the Iron Age. Among them are 18 fragments of briquetage (coastal pottery). This kind of pottery was used in the production of salt, and in its transportation to consumers.\(^5\) It will be discussed separately at the end of this section.

The pottery will be discussed per context in this section. Of the larger complexes (more than 100 sherds) the technological and typological characteristics are set out in Table 13.2. Where applicable, references will be made to this table in the descriptions.

House 1

Two contexts near house 1 yielded sufficient material for an analysis. It concerns a pit inside the house plan (S1165) and a pit which can be counted as part of the yard of this plan (S2025).

S1165

Two contexts near house 1 yielded sufficient material for an analysis: a pit inside the house plan (S1165) and a pit which can be counted as part of the yard of this plan (S2025).

Pit 1165

This pit yielded a total of 120 sherds and 27 pieces of small indeterminable fragments. The characteristics of this complex are given in Table 13.2. As temper material mainly crushed pottery was used, though some sherds were tempered with quartz (N=4). About a quarter of the sherds have a coarse-textured surface. In addition the complex included the following diagnostic pieces:

- Fnr. 762.1: A rim, wall and base sherd of a closed tripartite pot with an extremely short neck; form type 55a. The surface was coarse-textured halfway to the shoulder.
- Fnr. 762.2: A rim and wall sherd of a tripartite bowl or pot, which can probably be ascribed to form type 43.
- Fnr. 762.3: A plugged ear (rectangular cross-section).

Pit 2025

The complex consists of 51 sherds of which 3 pieces are small indeterminable fragments. The sherds seem to originate exclusively from two individual pots.

- Fnr. 897.1: 30 Rim, wall and base sherds of an open bowl/dish; the exact form type is unclear. The pottery wall is smooth / polished and tempered with crushed pottery. The base consists of a footring (type B2).

\(^4\) Van den Broeke 2012.  
\(^5\) Van den Broeke 2012.
Iron Age finds

Fnr. 897.2: 15 Rim and wall sherds of a pot with an S-shaped profile but angular transition from shoulder to neck; form type 55b. The surface of the pot has been coarse-textured to about halfway the shoulder. The pottery was tempered with crushed pottery.

**Dating**

Based on these two contexts, house 1 can probably be dated to the Early Iron Age. The presence of form type 55b in pit 2025 supports this. Form type 43 from pit 1165 also dates to the Early Iron Age or at most to the beginning of the Middle Iron Age (phase E). The same applies to the ear. Eared pottery does in principle no longer occur after the Early Iron Age.
Near this house plan, six features contained sufficient material for an analysis. It concerns four pits inside the house plan (S918, S1140, S2032, and S2034). Pits S789 and S793 are located in the yard immediately north of the plan.

**Pit 918**
This pit yielded a total of 148 sherds, of which 39 pieces of small indeterminable fragments. The technological characteristics of this complex are set out in Table 13.2. About half of the pottery was tempered with a combination of crushed pottery and crushed quartz. The remaining pottery was tempered only with crushed pottery. About 60% of the sherds have a coarse-textured surface. The percentages are possibly slightly distorted as a large part of the coarse-textured sherds seem to derive from one individual pot. This could also explain the relatively large number of sherds with crushed quartz and crushed pottery tempering. The complex contained in addition the following diagnostic pieces:
- Fnr. 848: 17 Rim, wall and base sherds of a tripartite pot, probably form type 55a or b. The surface appears to be entirely smooth. The pottery was tempered with crushed pottery.
- Fnr. 765: A complete tripartite pot, form type 41. The surface is smooth / polished and the pottery was tempered with crushed pottery.
- Fnr. 766: A complete tripartite bowl/dish, form type 71. The surface is smooth / polished and the pottery was tempered with a combination of crushed quartz and crushed pottery.
- Fnr. 336.1: 23 Rim and wall sherds of a tripartite pot with decorated raised cordon on the transition from shoulder to neck.

**Pit 1140**
This pit yielded 615 sherds, of which 109 pieces of small indeterminable fragments. Most sherds can be assigned to two large coarse-textured pots. These can be described as follows:
- Individual 1: 78 Rim, wall and base sherds of a tripartite pot, form type 58. The body of the pot was coarse-textured. On the shoulder is a raised cordon decorated with...
fingertip impressions. A combination of crushed quartz and crushed pottery was used as tempering material.

- Individual 2: Rim, wall and base sherds of a tripartite pot, form type 55a. The body was coarse-textured, the shoulder and neck are smooth. On the transition from shoulder to neck there is a decorated raised cordon. A combination of crushed quartz and crushed pottery was used as tempering material.

Pit 2032

The pit yielded 62 sherds, of which 21 pieces of small indeterminable fragments. The material seems to be mainly tempered with crushed pottery. No quartz temper was observed. The following diagnostic pieces are present:

- Fnr. 885.1: A rim sherd of a tripartite pot with a sharply outward flaring neck/rim (Schrägrand); exact form type unclear (53 or 55b?).
- Fnr. 893.1: A rim sherd of a tripartite pot with short, slightly outward flaring neck/rim. The walls have a rough surface but are not coarse-textured.

Pit 2034

The complex of this pit consists of 18 sherds with no diagnostic characteristics. No quartz tempering has been observed. Only one diagnostic piece is present:

- Fnr. 895.1: A rim sherd of a tripartite pot with a sharply outward flaring neck/rim; form type 71. The surface has been smoothed and the pottery was tempered with crushed pottery.

Pit 789

This pit yielded 84 sherds, 10 pieces of which were indeterminable fragments. Most of the sherds seem to belong to one individual pot:

- Fnr. 791.1: Rim and wall sherds of a large tripartite pot, form type 55b. The body has been coarsely textured and the neck and rim are smooth. The pottery was mainly tempered with crushed pottery, with some additional broken quartz. There is also some decoration, which consists of a rim decoration with fingertip impressions and a row of fingertip impressions on the transition from shoulder to neck.

Pit 793

The pit yielded 77 sherds, of which 18 pieces are indeterminable fragments. Tempering material mainly consists of crushed pottery. A small part was tempered with broken quartz. There is one diagnostic piece:

- Fnr. 850.1: A rim sherd of a slightly closed tripartite pot with a short neck, probably form type 52.

Dating

Based on the contexts described above, house 2 can be dated to the first half of the Early Iron Age. Form types 41 and 71 from pit 918 in particular point in this direction. These form types do indeed occur in several other periods of the Iron Age but in combination with the different pots of types 55a/b and 58, they can be dated more accurately to the first half of the Early Iron Age (phases A and B).
Figure 13.5
A selection of the pottery found near house 2
(scale 1:2)
House 4
Associated with this house plan were two pits containing sufficient material for an analysis. It concerns pits 1026 and 1027, both located inside the plan.

Pit 1026
This pit yielded 12 sherds of hand-formed pottery and a fragment of a spindle whorl. Almost all pottery sherds were tempered with crushed quartz, including the fragment of the spindle whorl. The following diagnostic pieces are present in the complex:
- Fnr. 783.1: A wall sherd with a lug join.
- Fnr. 851.1: A rim sherd of a slightly closed tripartite pot with a short neck/rim; form type 55a or 56a. A raised cordon decoration has been applied to the neck, decorated with fingertip impressions. The surface of the pot was coarse-textured up to the raised cordon. A rim fragment fitting this pot was found in the other pit inside house 4.

Pit 1027
The pottery complex from this pit consists of 55 sherds, of which 22 pieces are small indeterminable fragments. A considerable part of the sherds (N=16) was tempered with broken quartz. Apart from sherds of the pot with raised cordon described above (fnr. 851.1), this pit contains only little other diagnostic material:
- Fnr. 906.1: A rim sherd of a shallow smooth-walled small bowl. The fragment is slightly oblong and therefore possibly part of a spoon or pottery for serving up food (Dutch: schepaardewerk)

Figure 13.5 vervolg
A selection of the pottery found near house 2 (scale 1:2)
Dating

Based on the considerable quantity of quartz-tempered pottery and the presence of eared pottery as well as the pot with form type 55a/56a, this complex can be dated to the Early Iron Age. A more accurate date is not possible on the basis of these pieces.

Pit 1534

The complex consists of 193 sherds, 23 pieces of which are small indeterminable fragments. The largest part of the complex consists of undecorated wall sherds. For none of the sherds could the form type be reconstructed. A considerable part of the pottery (c. 35-40% was tempered with broken quartz, whether or not in combination with crushed pottery). About 25-30% of the sherds were finished with a coarse-textured surface. The following diagnostic pieces are present:

- Fnr. 867.1: A wall sherd of a tripartite pot with lug join.
- Fnr. 963.1 One small ear.

Dating

The pottery from loam extraction complex 1 can be dated to the Early Iron Age based on the technological characteristics (a high share of quartz-tempered pottery) and on the presence of eared pottery.

Loam extraction complex 3

From this loam extraction complex, only pit 201 yielded sufficient diagnostic material for dating. A total of 68 pottery sherds were found in this pit. Only a few sherds in this complex have a coarse-textured surface. The same applies to quartz tempering, which apart from the coarse quartz tempering in fnr. 718.1 (see below), occurs rarely. The picture could possibly be distorted because most sherds originate from only two individuals. The following pieces say a little more about the dating of this pit:

- Fnr. 721.1: Wall and rim sherds of a small bowl/dish with a flattened ear up to the rim; form type 51 (Henkeltasse). The piece is smooth walled and was tempered with crushed pottery.
- Fnr. 718.1: Rim, wall and base sherds of a tripartite pot, form type 23b. On the neck a single row of nail impressions is present. The pot was rough-walled and tempered with relatively coarse crushed quartz.
- Fnr. 718.2: Rim, wall and base sherds of a slightly closed bowl/dish, form type 21. The bowl is smooth walled and was tempered with crushed pottery.

Dating

Based on the presence of the Henkeltasse and form type 23b, the pottery complex from pit S201 can be dated to the Early Iron Age. The exact date could possibly be
rather early in this period (phases A–B). The decoration of a row of nail impressions on
the neck is indeed typical of the Late Bronze Age and quickly becomes rare in the Early
Iron Age.\textsuperscript{6}

\textit{Loam extraction complex 5 (pit 444)}

This complex concerns one pit which can probably be interpreted as a loam extraction
pit. Most of the find material originates from the upper layers of the pit (secondary fill).
The complex yielded a total of 176 pottery sherds. The technological and typological
characteristics of the complex are set out in Table 13.2. The largest part of the pottery
was tempered with crushed pottery (76\%, N=133). A small quantity of sherds (12
\%, N=21) was tempered with a combination of crushed pottery and crushed stone
(quartz). The share of sherds with a coarse-textured surface is relatively high (36\%). The
following diagnostic pieces are present in the complex:

- \textit{Fnr. 662.1}: A complete profile of a closed pot with a long neck; form type 75. The
  pottery was tempered with crushed pottery and has a polished surface.
- \textit{Fnr. 661.1}: A rim sherd of a closed pot with neck. The pot has a bent profile, form
  type 72 or 75. The pottery was tempered with crushed pottery and has a polished
  surface.
- \textit{Fnr. 711.1}: A rim sherd of a closed barrel-shaped pot, form type 23a. The pottery
  was tempered with crushed pottery and has a coarse-textured body.

\textsuperscript{6} Van den Broeke 2012, 126
Based on form types 72 and 75, this complex can be dated to the first half of the Middle Iron Age (phases E-F).

*North-eastern pit cluster*

Seven pits within this cluster yielded sufficient pottery for an analysis.

*Pits 221/2140*

The two halves of this single pit were excavated in different trenches, thus acquiring two different feature numbers. A total of 155 determinable sherds were present in the pit. The technological and typological characteristics of the complex are set out in Figure 13.8.

*Figure 13.8*

Pottery from pit S444. Scale 1:2.
Table 13.2. The largest part of the pottery was tempered with crushed pottery (73%, N=113). A combination of crushed pottery and crushed quartz was used as temper for 16 sherds (10%). A strikingly high percentage (82%, N=127) has a smoothed or polished surface. The share of coarse-texturing on the other hand is relatively low with 6% (N=9). The following diagnostic pieces are present:

- **Fnr. 595.1:** A complete profile of a beaker with an ear up to the rim, form type 51.
- **Fnr. 595.2:** A complete profile of a small open bowl, form type 5a.
- **Fnr. 595.3:** A base sherd with a crosshatching decoration on the underside of the base.
- **Fnr. 595.4:** A complete profile of a small open bowl, form type 5a.
- **Fnr. 595.5:** A rim sherd of a closed pot with a short neck, probably form type 57.
- **Fnr. 716.1:** A rim sherd of a sharply closed pot without neck, probably form type 45a. About 5 cm under the rim a row of fingertip impressions has been applied.
- **Fnr. 716.2:** Rim and wall sherds of a closed bowl with short neck, probably form type 41.
- **Fnr. 1136.1:** Rim and wall sherds of a small closed bowl with short neck and ear join, form type 51.
- **Fnr. 1136.2:** A complete profile of a closed bowl with short neck. The transition from body to shoulder is bent, form type 71.

**Dating**

Based on the presence of different specimens of form type 51, this complex can be dated to the Early Iron Age. In combination with the presence of form types 41, 71 and possibly 45a, the complex can be more accurately dated to phases B/C.

**Pit 567**

In this pit a total of 19 sherds were found. The pottery is exclusively tempered with crushed pottery. Fnr. 622.1 also appears to contain some organic tempering. One sherd has a coarse-textured surface. The assemblages appears to represent only a limited number of specimens:

- **Fnr. 622.1:** 11 rim, wall and base sherds of an open bowl or dish, form type 3b. There is comb drag-mark decoration present on the rim.
- **Fnr. 470.1:** 1 rim and 1 wall sherd of a slightly closed bowl/pot, form type 21 or 22. The surface of the walls has been smoothed. The body is decorated with comb drag-mark decoration.

**Dating**

Decorated bowls or dishes of form type 3b are limited mainly to the end of the Early Iron Age or the first half of the Middle Iron Age (phases D-F). The bowls of form types 21 and 22 are more difficult to date exactly, but they are also known from phases D-F.

**Pit 525**

The pottery assemblage recovered from this pit consists of 16 base and wall sherds from 1 individual in black polished / smoothed pottery. The pottery has been tempered with crushed pottery. It probably concerns a relatively low tripartite dish or pot of form types 71 or 73. The base can be described as a large omphalos (base type B5). One of the wall sherds has been decorated with a loose small round dent (form type D1).

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7 Van den Broeke 2012, 49.
Figure 13.9
A selection of the pottery from pit S221/S2140.
Scale 1:2.
Based on the present form types the assemblage should be dated in the Early or Middle Iron Age. The date can be narrowed by means of the type of decoration. Decoration in the form of small round dents occurs either in small groups or covers the surface of the pot completely. The first motif is limited to the Early Iron Age (phases B and C). Dells in a surface-covering pattern are typical of the advanced Middle or Late Iron Age. The surface of the specimen from pit 525 was clearly not entirely decorated and should therefore be dated to the Early Iron Age.

**Pit 503**

This pit yielded a total of 24 sherds, 8 of which are small indeterminable fragments. The pottery has mainly been tempered with crushed pottery and in one case with a combination of crushed pottery and crushed quartz. Four wall sherds have a coarse-textured surface. The following diagnostic pieces are present in the complex:

- **Fnr. 612.1**: A wall sherd of a tripartite pot, probably form type 43 or 45b (Schräghals). The exterior surface has been smoothed and the pottery has been tempered with a combination of crushed pottery and crushed quartz.
- **Fnr. 474.1**: A rim sherd of a closed barrel-shaped pot with short outward flaring rim. The rim is decorated with deep fingertip impressions. On the transition from body to shoulder there is a row of deep fingertip impressions.

*Figure 13.10*  
Pottery from pit 5567. Scale 1:2.
Dating
On the basis of the presence of form types 43 or 45b this complex can be dated to the Early or at most the beginning of the Middle Iron Age.

Pit 520
The pottery assemblage consists of 65 sherds, of which 19 pieces are small indeterminable fragments. Of the determinable sherds eight have been tempered with crushed quartz, whether or not in combination with crushed pottery. In a few cases it seems that organic material was also added as tempering material. Thirteen sherds have a coarse-textured surface. In four cases the pot form could be partially reconstructed. It concerns two open bowls/dishes and two closed forms with neck. However the exact form types are unclear. One sherd has been decorated with comb drag-marks. In addition one diagnostic piece is present:

- Fnr. 633: A fragment of a knobbly ear. No drilling is visible.

Dating
Based on the number of sherds with quartz tempering, this complex can probably be dated to the Early Iron Age. The presence of the knobbly ear also points in this direction.

Pit 521
The complex consists of 90 sherds, 22 pieces of which are small indeterminable fragments. Of the determinable sherds a total of 7 have been tempered with broken quartz and 23 pieces have a coarse-textured surface. In one case could the pot form could partially be reconstructed. It concerns an open bowl/dish but the exact form type is unclear. One sherd in the complex is decorated, with serrated spatula decoration.

In this assemblage some salt containers are present. It concerns in total 7 fragments, among which at least one gully-shaped example (Dutch: zoutgootje).

Dating
Based on the quantity of sherds with quartz tempering and the percentage of coarse tempering, this complex can be dated to the Early Iron Age. Based on the fragment of a gully-shaped salt container, this date can be further refined to the second half of the Early or the beginning of the Middle Iron Age (phases C-E).
This pit yielded 96 sherds of determinable pottery. The technological and typological characteristics of the complex have been set out in Table 13.2. By far the largest part of the pottery has been tempered with crushed pottery (N=74). In a few cases crushed quartz or a combination of crushed quartz and crushed pottery was used. A total of 17 sherds have a coarse-textured surface. In nine cases the pot form could be partially reconstructed. It concerns three open bowls/dishes, two closed forms without neck and four indeterminable closed form types. There is hardly any decoration present in the complex. Five wall sherds are decorated, among which one sherd with a striking decoration of grooves and round impressions made with a bird bone.

Two fragments of salt containers are present, but their original form could no longer be determined.

Dating
The complex has too few diagnostic pieces for an accurate dating. Based on the presence of coastal pottery and a small quantity of quartz-tempered pottery, it can probably be dated to the second half of the Early Iron Age or the beginning of the Middle Iron Age.

Other contexts

Pit 866
This silo pit with loam walls contained a small complex of hand-formed pottery. It concerns a total of 17 sherds, 1 of which was tempered with crushed quartz. The following diagnostic pieces are present:

- Fnr. 272/281: Two rim sherds of an open dish with a stepped profile (Dutch: haakrand), form type 4. The pottery was tempered with crushed pottery and the surface has been smoothed.

Dating
Form type 4 has seen a relatively short period of use in the second half of the Early Iron Age and possibly also in the beginning of the Middle Iron Age (phases C-E).
Pit 1732
In this special pit, apart from the group of loom weights and the millstone (see above), also a small quantity of pottery was found. Of a total of 45 sherds, 25 pieces are small indeterminable fragments and small lumps of burnt loam. The remaining sherds largely (minimally 10 sherds) appear to belong to one individual vessel:

· Fnr. 447.1: Rim and wall sherds of a tripartite bowl/pot with a sharply outward flaring neck (Schräghals), form type 53. The pot has a smooth surface and the pottery has been tempered with crushed pottery.

Dating
Form type 53 can be dated to the first half of the Early Iron Age (phases A and B).

Pit 2424
This pit yielded a large assemblage of pottery (N=296). The technological and typological characteristics of this complex are set out in Table 13.2. By far most of the pottery has been tempered with crushed pottery (93%, N=274). A small quantity of sherds (6%, N=17) has been tempered with a combination of crushed pottery and crushed stone (quartz). The share of pottery with a coarse-textured surface is relatively high (35%). Remarkable is the rather high share of closed forms without neck. The following diagnostic pieces are present in the complex:

· Fnr. 1163.1: A base sherd with a remainder of a comb drag-mark decoration on the body.
· Fnr. 1147.1: A rim sherd of a closed bowl/dish without a neck and with a comb drag-mark decoration on the body; form type 21 or 22. Possibly same individual as fnr. 1163.1.

Dating
The complex has too few diagnostic pieces for an accurate dating. Based on the relatively low percentage of quartz-tempering, a date at the end of the Early Iron Age or the beginning of the Middle Iron Age can be proposed. The rather high percentage of coarse-textured pottery supports this. From this period onwards closed forms without a neck are frequently occurring as well. The date of this complex therefore probably lies in the second half of the Early or first half of the Middle Iron Age.

Pit 2500
This pit yielded a relatively large quantity of sherds (N=107), nearly all of which however appear to originate from only two different coarse-textured pots. In addition there are 3 sherds of 3 different open forms, of which the exact form type is unclear. The coarse-textured pots may be described as follows:

· Fnr. 420.1: Rim and wall sherds of a closed tripartite pot, probably form type 58. The pot has a coarse-textured body and a smooth shoulder/neck. The pottery has been tempered with crushed pottery and a small quantity of crushed quartz.
· Fnr. 420.2: Rim and wall sherds of a closed tripartite pot, of which the exact form type is unclear (form type 45b or 58). This pot has a smaller size than individual 1, but otherwise there are many similarities. The pot has a coarse-textured body and a smoothed shoulder/neck. The pottery has been tempered with crushed pottery and a small quantity of crushed quartz.

Dating
Based on the present form types, this complex can be dated to the Early Iron Age or at most to the beginning of the Middle Iron Age.
V-shaped Iron Age ditch (Features 1530, 2413, 2426 and 2473)

The pottery from this ditch was selected for analysis to see whether indications could be found for a date of the ditch within the Late Iron Age. The ditch itself yielded only a very small quantity of hand-formed pottery (N=12), without further diagnostic characteristics. These include 10 undecorated wall sherds and 2 fragments of coastal pottery. The ditch was also cut into during the trial trenching campaign when a considerable quantity of Roman pottery was found in the top fill of the ditch (S9.1). This material probably originates from the Roman find spot on that location and ended up in the partially silted up ditch.

**Dating**

The pottery complex from the V-shaped ditch could not be dated more accurately than 'Iron Age'.

**Salt containers**

Salt containers or briquetage are made of a porous, chalky pottery which originated in the coastal regions of the Netherlands and Belgium. It was specifically made for the production of salt and used for transportation of the salt as well. Salt containers were only used during a limited period of time, from phase C in the Early Iron Age to the Roman Period. The forms changed through time, which makes salt containers very suitable for dating.

The investigation on the Cannerberg yielded in total 18 fragments of salt containers, almost all of which originated from the pits in the northern pit cluster (pits 45.19, 514, 639, 534, 389, and 520). In the southern part of the excavated area pit 2434 yielded
three sherds of coastal pottery. In most cases it was not possible to determine the exact form of the pottery. In four cases exact identification was possible. In each case it concerned gully-shaped salt containers (Dutch: zoutgootje) which can be dated from the second half of the Early Iron Age to the first half of the Middle Iron Age (phases C-E).^8

13.1.4 Conclusion

The excavation on the Cannerberg has yielded a relatively large assemblage of handmade pottery from the Iron Age. Due to the large amount of pottery, initially a quickscan was made, which resulted in a selection of contexts for further analysis. The material was subsequently described in accordance with the typology drawn up by Van den Broeke for Oss-Ussen.^9 For the period we are dealing with (the Early to Middle Iron Age) this typology is usable for the largest part of the southern Netherlands.

Based on this typology a number of the selected contexts could be dated rather accurately (Table 13.2).

<table>
<thead>
<tr>
<th>Object type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loom weights</td>
<td>17</td>
</tr>
<tr>
<td>Spindle whorls</td>
<td>6</td>
</tr>
<tr>
<td>Slingshots</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

By means of these sharply dated complexes, the Iron Age occupation on the Cannerberg can be placed from the beginning of the Early Iron Age to the first half of the Medieval Period (Van den Broeke’s phases A to F).

Although there probably was activity on the Cannerberg in the Late Iron Age, no pottery was found in the pottery analysis that could be clearly dated to the second half of the Middle Iron Age or Late Iron Age. During the quickscan no sherds clearly dating to these younger phases were found either.

13.2 Ceramic objects

Lucas Meurkens

The excavation yielded a total of 24 ceramic objects which can be dated to the Iron Age. These can be divided into the categories loom weights, spindle whorls and slingshots (Table 13.3). Loom weights and spindle whorls were used in the production of textiles. Slingshots were used as projectiles for a sling.

Loom weights

In late prehistory, loom weights occur in two different varieties. One group is truncated pyramidally to cone-shaped with one single drilling at the top. The second group is flat and triangular with drillings at the corners. The first group probably dates already from the Late Bronze Age but in any case from the Early Iron Age. From the beginning of the Middle Iron Age this type is replaced by the triangular loom weights.^10

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^8 Van den Broeke 2012, 172.
^9 Van den Broeke 2012.
^10 Van den Broeke 1987, 38.
All loom weights of the Cannerberg originate from one pit (1732). It concerns a total of 17 loom weights, 6 of which were fragmented. However, the most ‘complete’ specimens were all damaged as well. Based on their position in a pit (lying in a row) it looks as if the loom weights were complete when deposited in the pit and represent the remains of a loom which stood in this location. All loom weights are comparable in shape. They are rounded pyramid-shaped specimens with one drilling at the top. On a few of the more or less undamaged pieces (Figure 13.16) a depression was visible in the top of the weight. In case of fnr. 533 it is a small round depression, while in fnrs. 536 and 539 it is a shallow groove-like depression in a crosswise pattern. These depressions were probably meant for keeping the rope in place with which the weights were suspended.

**Spindle whorls**

In total 6 spindle whorls were found, 3 of which are complete (for instance Figure 13.17: fnr. 470). With the other specimens, it concerns two fragments and a rounded wall sherd with a drilled hole, which was possibly used as spindle whorl (Figure 13.17: fnr. 406). Spindle whorls themselves have little datable value and can therefore not be used for a possible dating of features.
Slingshots

Pit 1699 yielded several fragments of one slingshot. Slingshots have a typical rounded bi-conic shape with pointed ends. Slingshots are dated to the Middle and the Late Iron Age.\(^\text{11}\)

13.3 Stone

Annemieke Verbaas

For the Iron Age stone assemblage only a pilot analysis was performed. Therefore we only have information about heating of stones and the frequencies of tooltypes. No information about raw material, other than for the vesicular basalt and marl, is available.

The majority of the stone objects found during excavation could be dated to the Iron Age (\(N=2231\), Table 13.4). They comprise 56% of the total amount of stone artefacts found, and 62% of the stone tools that can be assigned to dated features. The percentage of tools is however very low (1.1%, \(N=25\)) and the majority of the assemblage consist of heated (and often broken) pieces (\(N=1619\); 73%). This high percentage of heated and broken stone artefacts is not uncommon for the Iron Age and they can probably be considered as cooking stones\(^\text{12}\).

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>total number</td>
<td>2231</td>
<td>100,0</td>
</tr>
<tr>
<td>heated</td>
<td>1619</td>
<td>72,6</td>
</tr>
<tr>
<td>total tools</td>
<td>25</td>
<td>1,1</td>
</tr>
<tr>
<td>Quern</td>
<td>10</td>
<td>0,4</td>
</tr>
<tr>
<td>Hammerstone</td>
<td>3</td>
<td>0,1</td>
</tr>
<tr>
<td>adze fragment</td>
<td>1</td>
<td>0,0</td>
</tr>
<tr>
<td>pound/polishingstone</td>
<td>1</td>
<td>0,0</td>
</tr>
<tr>
<td>smooth surface</td>
<td>1</td>
<td>0,0</td>
</tr>
<tr>
<td>possible tool</td>
<td>9</td>
<td>0,4</td>
</tr>
</tbody>
</table>

Most of the tools are querns and querns fragments. The category “possible tools” is the second most common. Specimens from the latter category are either very small fragments of tools, or objects with a smooth surface for which it is uncertain whether this is due to use or natural processes. The most striking find is a fragment of an adze. The adze is made of amphibolite. It is a lateral fragment with a small part of the cutting edge present. Typologically this adze is dated to the LBK and no traces of reuse\(^\text{13}\) were seen. It therefore seems very unlikely that it dates to the Iron Age and it therefore has to be interpreted as a kick up.

A total of 11 pieces of vesicular lava were found. Finds of vesicular lava are well known from the Iron Age in Southern Limburg\(^\text{14}\). The material is not locally available and is probably imported from quarries in Mayen\(^\text{15}\). Therefore all pieces have to be considered as having been part of a quern\(^\text{16}\). It is however unclear how many individual querns are represented by these 11 pieces of vesicular lava.

\(^\text{11}\) Van den Broeke \(1987, 38\).
\(^\text{12}\) Van den Broeke \(1987, 38\).
\(^\text{13}\) See for example Knippenberg \(2006; Melkert 2011\).
\(^\text{14}\) See for example Knippenberg \(2006; Melkert 2011\).
\(^\text{15}\) Harsema \(1979\).
\(^\text{16}\) See for example Melkert \(2015\).
Unfortunately no tools were recovered from the house structures themselves (Table 13.5). The amount of pieces of stone varies between the individual houses and some houses show a higher percentage of heated stones than others. We are not sure how to explain these differences, but they may be related to house size, how much of the house was recovered and the amount of pits that could be connected to the houses or the activities performed in these houses.

Next to the houses and outbuildings some pits deserve mentioning (Table 13.6). First of all four clusters of loam extraction pits were found. In these pits only few stone artefacts were found. One exception is pit 1534 (belonging to loam extraction complex 1) from which 300 stone artefacts were recovered, most of these heated. The percentage of heated artefact from these pits varies greatly, from 60% to 91% (pits with small amounts excluded). As the secondary use of these loam extraction pits is probably a waste pit, it seems that there is a difference in activities that have filled the waste pits.

Another special pit is 1732 (Figure 13.18). In this pit, amongst other finds, a number of clay loom weights were found (§12.2.5). The loom weights were positioned in a line as if they had just fallen from the loom. A total of 75 stone tools were found in this pit. Most of these are unworked and mainly heated pieces, but also 6 tools were recovered.

The most important find is a complete quern set, consisting of the passive lower part made from vesicular lava, and the hand-held upper part made from an angular quartzite pebble, specifically shaped to this purpose. The latter was lying on top of the former when found. The other tools comprise two heated quern fragments of sandstone, one with some kind of black caking adhered. The caking is probably soot from the fire. These fragments were found together with many other heated stone fragments and were probably reused as a cooking stones. The same is true for the fragment of a heated possible tool made of quartzite.

### Table 13.5
Amount and percentage of heated stones per yard.

<table>
<thead>
<tr>
<th>house</th>
<th>total</th>
<th>Heated</th>
<th>% heated</th>
</tr>
</thead>
<tbody>
<tr>
<td>house 1</td>
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<td>134</td>
<td>84</td>
</tr>
<tr>
<td>house 4</td>
<td>290</td>
<td>204</td>
<td>70</td>
</tr>
<tr>
<td>house 2</td>
<td>13</td>
<td>9</td>
<td>69</td>
</tr>
<tr>
<td>house 3</td>
<td>94</td>
<td>88</td>
<td>94</td>
</tr>
<tr>
<td>outhouse 2</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>total</td>
<td>557</td>
<td>435</td>
<td></td>
</tr>
</tbody>
</table>

### Table 13.6
Overview of finds from special features, silos and pit clusters.

<table>
<thead>
<tr>
<th>feature or cluster</th>
<th>Total</th>
<th>amount burned</th>
<th>% burned</th>
<th>quern</th>
<th>pound/polishingstone</th>
<th>smooth surface</th>
<th>possible tool</th>
<th>total</th>
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<tbody>
<tr>
<td>loam pits cluster 1</td>
<td>349</td>
<td>315</td>
<td>90</td>
<td>1</td>
<td></td>
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<td>1</td>
<td>2</td>
</tr>
<tr>
<td>loam pits cluster 2</td>
<td>5</td>
<td>4</td>
<td>80</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>loam pits cluster 3</td>
<td>62</td>
<td>40</td>
<td>65</td>
<td>-</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>loam pits cluster 4</td>
<td>7</td>
<td>7</td>
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<td>1</td>
<td></td>
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<td>1732</td>
<td>75</td>
<td>40</td>
<td>53</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>498</td>
<td>406</td>
<td>388</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>11</td>
</tr>
</tbody>
</table>
Another piece of vesicular lava was found in this pit, but it does not show any traces of modification or use. Finally a large pound/polishing stone with multiple used facets was recovered. The percentage of tools is quite high (8%) compared to the rest of the site, again indicating the special nature of this pit.

13.4 Metal

Lucas Meurkens

Based on their context two bronze objects found during the excavation can be dated to the Iron Age with certainty. They comprise two (fragments of) a bronze pin or needle (Figure 13.19).

Pit 221/2140, a deep pit with an irregular cross-section which can possibly be interpreted as loam extraction pit, yielded two small fragments of a bronze pin with a bulging head (fnr. 714). Based on the date of the pottery found in this pit, the pin can be dated to the Early Iron Age.

The second piece of metal is a bronze needle (fnr. 693) from pit 1165. This pit is located inside house 1 and is also dated to the Early Iron Age. The needle is slightly bent and relatively thin (< 1 mm). The needle still has a pointed end but the head has been broken off. It is not clear what kind of object this was originally. It could have been, as in fnr. 714, part of a pin, though the piece seems to be a bit thin for that. Another possibility is that we are dealing here with the needle of a brooch (fibula).

Figure 13.16
The tools from pit 1732 (the two still unwashed tools are not pictured).

Figure 13.17
Bronze objects from pits 221/2140 (top) and from pit 1165 (bottom).
Fruits and seeds from the Iron Age

Corrie Bakels

14.1 Introduction

Ten Iron Age features were sampled for the retrieval of fruits and seeds: five concerned silos; two pits are interpreted as pits originally dug for the extraction of loam; one revealed a row of loom weights; and the remaining two had an unspecified function. Five are dated to the Early Iron Age, one to presumably the Early Iron Age, one to the Middle Iron Age and two of the silos could not be attributed to anything more specific than the Iron Age.

The samples were treated in the same manner as those of the Bandkeramik described in §11.1. All botanical remains were charred.

14.2 Results

The results are presented in Table 14.1. Find densities (remains per litre of soil) range from zero to 20. The plants retrieved are mainly crop plants and wild herbs which can be classified as field weeds. A fragment of a hazelnut shell (Corylus avellana L.) must derive from a nut gathered in a wild stand of hazel. The single specimen of knotgrass (Polygonum aviculare L.) may have its origin on a path, but the plant can also occur in fields.

The finds represent the scattered remnants of the burning of agricultural waste. They do not represent the original function of the features in which they were encountered. The scientific value of this kind of material lies in the fact that it provides us with information on the common waste lying around in a settlement and that it represents the most common plants to be found there. That is, as far as it concerns waste that was burned and could leave charred remains behind.

In the case of Maastricht-Cannerberg the remains reveal that five crop plants were of importance: hulled barley (Hordeum vulgare L. var. vulgare), emmer wheat (Triticum dicoccum Schübl.), broomcorn millet (Panicum miliaceum L.), gold-of-pleasure (Camelina sativa L.) and linseed/flax (Linum usitatissimum L.). A sixth, einkorn wheat (Triticum monococcum L.), may have been present as well, but this grain may also represent a grain from an emmer ear in which only one grain ripened instead of the more usual two. The weeds are supposed to have come along with the crops from the fields.

The Middle Iron Age waste does not differ from that dated to the Early Iron Age as far as can be concluded on the basis of one sample.

When the list of crop plants is compared with that of other Iron Age settlements excavated on the loess soils of the southeastern Netherlands, Sittard-Geleen 'Hof van Limburg' for instance, it appears that several crop plants that may have been present are missing. These are bread wheat, spelt wheat, Italian millet and the pulses pea and
horse bean.¹ But in Sittard-Geleen ‘Hof van Limburg’ emmer wheat and barley were the most common crops and this tallies with the situation at Maastricht-Cannerberg. As broomcorn millet is also found to have been common in both sites, it may safely be inferred that this crop can be added to the list of most common crops at this time in this region. The absence of the ‘missing’ crops may be attributed to the limited number of samples.

Sittard-Geleen ‘Hof van Limburg’ also displayed a longer list of field weeds, but as the most common species found are the same as at Maastricht-Cannerberg this fact leads to the conclusion that the modest number of species reported on here is to be attributed to the limited number of samples as well. Three weeds are low-growing: annual mercury (*Mercurialis annua* L.), ribwort plantain (*Plantago lanceolata* L.) and knotgrass (*Polygonum aviculare* L.). Their maximum height is 40 cm. This fact implies that the crops were harvested rather low on the stalk.

<table>
<thead>
<tr>
<th>findnumber</th>
<th>278</th>
<th>448</th>
<th>722</th>
<th>802</th>
<th>899</th>
<th>1165</th>
<th>669</th>
<th>58</th>
<th>1158</th>
<th>1157</th>
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<tbody>
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<td></td>
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<td></td>
<td></td>
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<td>sample size litres</td>
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**Crop Plants**

<table>
<thead>
<tr>
<th>Crop Plants</th>
<th>Hordeum vulgare</th>
<th>Triticum dicoccum</th>
<th>Triticum monococcum</th>
<th>Triticum spikelet base</th>
<th>Triticum glume base</th>
<th>Cerealia indet.</th>
<th>Panicum miliaceum</th>
<th>Camelina sativa</th>
<th>Linum usitatissimum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Nuts**

<table>
<thead>
<tr>
<th>Nuts</th>
<th>Corylus avellana</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

**Wild herbs**

<table>
<thead>
<tr>
<th>Wild herbs</th>
<th>Bromus secalinus type</th>
<th>Bromus sp.</th>
<th>Chenopodium album</th>
<th>Echinochloa crus-galli</th>
<th>Fallopia convolvulus</th>
<th>Lapsana communis</th>
<th>Mercurialis annua</th>
<th>Persicaria sp.</th>
<th>Plantago lanceolata</th>
<th>Poa pratense/trivialis</th>
<th>Poaceae sp.</th>
<th>Polygonum aviculare</th>
<th>Rumex acetosella</th>
<th>Vicia hisruta</th>
<th>Vicia tetrasperma</th>
<th>Indeterminatae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 14.1**

Seeds and fruits found in the settlement dated to the Iron Age. EIA=Early Iron Age, MIA=Middle Iron Age, IA=Iron Age. Cf indicates presumably.

1 Bakels 2013.
Part 4

Roman Period, Modern times and WW2
land use
15 Roman Period habitation

Lucas Meurkens

15.1 Introduction

The excavations yielded a small number of settlement features dating to the Roman Period. During fieldwork features were assigned to this period based on the fill and finds they contained, but since the fill of these features is similar to that of the preceding Iron Age it cannot be excluded that some of the Iron Age features without finds actually date to the Roman Period. In this chapter only those structures and features are discussed that could certainly be dated to the Roman Period (through finds or association with other features). Only a selection of the Roman Period features was investigated during the excavation. This was partly due to the fact that not all Roman Period features were recognised as such in the field. Another factor was that these features were discovered in the final phases of the fieldwork in which there was too little time to investigate all features.

<table>
<thead>
<tr>
<th>type</th>
<th>amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>posthole</td>
<td>10</td>
</tr>
<tr>
<td>pit</td>
<td>11</td>
</tr>
<tr>
<td>ditch</td>
<td>2</td>
</tr>
</tbody>
</table>

15.2 Description of the Roman Period features

Features from this period concentrate in the south-east of the excavated area. The features include part of a house plan, an outbuilding (granary?), several ditches and pits. Based on associated pottery finds the features are dated between ca. 50 and 150 AD.

House plan

The house plan was recognised as such during fieldwork, despite it being only partially preserved. It consists of a row of three large postholes (remaining depth between 37 and 74 cm). The fill of two of the three postholes (features 1658 and 1663) contains large fragments of marl. These marl-filled postholes have been interpreted as part of a central row of roof-bearing posts. The posts were either resting on marl foundation blocks or the marl blocks functioned as additional support for posts dug into the soil. The row of roof-bearing central posts normally ends in the short walls. We can thus assume that the part of the plan excavated here is the northeastern part. The minimum length is about 12.5 m. The width will have measured between 6 and 7 m.

Typologically this fragmentary house plan (house 1) can be defined as a type Alphen-Ekeren. This is a two-aisled plan with a central row of roof-bearing posts. The walls usually consist of regularly placed wall posts, sometimes associated with a shallow wall ditch. Both wall posts and –ditch are usually dug less deep that the central roof-bearing posts. Because of this the central posts are often the only thing remaining from this type of plans, as is the case on the Cannerberg. The Alphen-Ekeren type house is distributed widely during the Roman Period and is found both on the sand and loess soils of the southern Netherlands.¹

¹ Hendriks & Van Enckevort 2014.
Figure 15.1
Overview of structures and features dating to the Roman Period.
Apart from the marl blocks hardly any objects were found in these features. Posthole 1663 yielded two small wall sherds of coarse ware, which could not be dated any more precisely than 'Roman Period'.

**Granary**

Directly adjacent to house 1 a four post-outbuilding, probably a granary, was found. Its dating in the Roman Period is mainly based on the cutting of this granary over the Late Iron Age V-shaped ditch. The plan measures $2.85 \times 1.65$ meter and the individual features have a remaining depth between 52 and 66 cm. No pottery or other material was found in these features.

**Pits**

A total of 10 pits has been dated to the Roman Period based on their fill, the presence of Roman Period pottery and the fact that they cut the Late Iron Age ditch. The pits are all located in the area to the south of house 1. Five pits have been investigated by sectioning. Pits 2475, 2495 and 2496 turned out to be rather shallow (remaining depth 10-15 cm) with an irregular cross-section. The function of these pits is not clear. Pit 1690 had a remaining depth of 1 meter and a relatively clean fill, but the function of...
this pit is unclear too. Pit 2483 may be interpreted as a watering trough for livestock and other animals. In cross-section the pit has a rather shallow slope and a maximum depth of about 50 cm. The bottom of the pit is flat and yielded a concentration of marlblocks. Finds from this pit consist of wheel-thrown Roman pottery (N=56), Roman tile fragments (N=41) and stone fragments (N=8). Amongst the latter group there is a large fragment of a quern made of vesicular lavastone.

Ditches
The excavation has yielded a number of ditches, two of which probably date to the Roman Period. One of the ditches is orientated WSW-ENE and crosses the entire excavated area. In some of the excavation trenches the outline of this ditch was not clearly defined. It is not entirely certain therefore if the interruptions as shown in figure 15.1 are all certain interruptions or caused by bad visibility of the ditch outline. The ditch is ca 0.5 m wide with a bowl-shaped cross section and a depth between 10 and 30 cm.

This ditch is dated to the Roman Period mainly on the basis of the fact that it cuts the Late Iron Age V-shaped ditch and therefore must date after the Iron Age. The ditch is itself cut by younger 16th-18th century ditches. The fill of the ditch contained some finds, but these are difficult to date. They mainly comprise fragments of stone and flint (N=13). One sherd of handmade pottery was found and on several spots small fragments of bricks or Roman tiles were observed. No material that clearly dates to medieval or younger periods was found. A dating in the Roman Period thus seems most likely.

A second ditch-system was found directly to the north of house 1. This system consists of a small double ditch (distance between ditches ca. 4.8 m) with another ditch at a right angle. The ditches yielded 9 sherds of wheel-thrown Roman Period pottery. Moreover the orientation of this system is comparable with the orientation of house 1. The interpretation of the ditches is not entirely clear. The ditch system associated with house 1 can possibly be interpreted as a field-system. Another possibility is that these ditches are part of an enclosure ditch surrounding the settlement. A comparable example of such an enclosure ditch has been found at Maastricht-Lanakerveld.²

15.3 Conclusion

The Roman settlement was only partly investigated, so no conclusive remarks about the nature of this site can be made. The features and associated finds from the site point to a small rural settlement. No remains of stone-built architecture were found, so it does not appear to be a villa site. Several of these are known in the countryside around Roman Maastricht. Rural settlements without stone architecture are rarer, probably because of lower archaeological visibility. Examples are known from Veldwezelt (B)³, Maastricht-Lanakerveld⁴, Maastricht-Landgoederenzone⁵ and Heerlen-Trilandis.⁶ Most of these settlements yielded several Alphen-Ekeren type houseplans associated with watering troughs and, in some cases, ditches surrounding the settlement. In several cases these rural settlements did develop into villas with

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2 Meurkens & Van Wijk 2009
3 Pauwels 2007.
5 Hazen & Blom 2015.
6 Tichelman 2015.
stone-built architecture (e.g. Maastricht-Landgoederenzone). It should be questioned
however whether the ‘simpler’ rural settlements should be interpreted as a different
type of settlement (as opposed to the villa sites) or whether they represent an (earlier)
phase of the same type of settlement, in which the main building for whatever reason
was not (re)built in stone.
Roman Period finds

16

Esther van den Brink

16.1 Pottery

The excavation yielded a small amount of Roman Period pottery which will be presented in this chapter. During the analysis the pottery was first divided in main categories (i.e. terra sigillata, colour-coated pottery, smooth ware, etc.). Because of time constraints no specialist fabric analysis was preformed. Types of fabric and their provenance were determined using *The national Roman fabric reference collection*, *Roman pottery in the Tongeren reference collection* and *La céramique Romaine en Gaule du Nord*. Because of time constraint no in-depth microscopic fabric analysis was preformed.

In addition to categories and fabric, colour, decoration and other prominent features (applications, stamps, and inscriptions) were recorded. Several typologies were used to define and date the pottery.

During the analysis different methods of quantification were used. In addition to the total number (N) of fragments per category, the minimum number of individuals (MNI) was calculated. The total weight per category was added as well. Furthermore, the estimated vessel equivalents (EVE's) were calculated, as were the degree of completeness and the degree of breakage. Using these different methods next to each other will facilitate future comparisons with other pottery complexes, since not all specialists use the same quantification methods. Caution is advised while comparing these different quantification methods however. For example, in addition to giving a general quantification, the total number of fragments also tells us something about the degree of fragmentation of a vessel. E.g. colour-coated ware is usually more fragmented than amphorae are. The same applies to the weight of the different categories. For instance, fragments of thick-walled pottery will weigh more than colour-coated ware.

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1 I would like to thank Joep Hendriks for his help during my analysis.
2 Tomber & Doreé 1998.
3 Willems 2005.
4 Brulet et al. 2010.
5 The most used monographs were Gose 1950, Holwerda 1941, Oelmann 1914 and Stuart 1963/1977. In addition Hiddink 2010 was used, because he specifically describes the Roman pottery from the south of the Netherlands.
6 The MNI was based on the presence of rim fragments. Rim fragment(s) have an MNI of 1. Wall, base, handle or spout fragments have an MNI of 0.
7 EVE: a rim is measured as a percentage of the complete rim by use of a rim chart. One can then let the rim stand representative of the whole vessel and use this figure as the EVE. For example, a complete rim is 1 and 25% of a rim is 0,25.
8 Degree of completeness = EVE/Total MNI
9 Degree of breakage = Total N/ EVE
10 Orton, Tyers & Vince 1993, 172.
16.1.2 Pottery description

In total 386 fragments of Roman pottery were found (MNI = 18). The total weight was 7381 g, of which 94.30% was wheel-thrown pottery and 5.70% hand made (Table 16.1). One fragment could not be identified.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Rim</th>
<th>Wall</th>
<th>Base</th>
<th>Handle</th>
<th>N</th>
<th>N%</th>
<th>MNI</th>
<th>MNI%</th>
<th>Weight</th>
<th>Weight%</th>
<th>EVE</th>
<th>EVE%</th>
<th>Degree of completeness</th>
<th>Degree of breakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terra sigillata</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>1.30%</td>
<td>1</td>
<td>5.56%</td>
<td>91</td>
<td>1.23%</td>
<td>0.03</td>
<td>0.0075</td>
<td>0.03</td>
<td>166.67</td>
</tr>
<tr>
<td>Terra nigra</td>
<td>3</td>
<td>45</td>
<td>-</td>
<td>-</td>
<td>48</td>
<td>12.44%</td>
<td>2</td>
<td>11.11%</td>
<td>105</td>
<td>1.42%</td>
<td>0.28</td>
<td>0.072</td>
<td>0.14</td>
<td>171.43</td>
</tr>
<tr>
<td>Colour-coated ware</td>
<td>-</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>11</td>
<td>2.85%</td>
<td>-</td>
<td>-</td>
<td>104</td>
<td>1.41%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Smooth ware</td>
<td>4</td>
<td>111</td>
<td>4</td>
<td>4</td>
<td>123</td>
<td>31.87%</td>
<td>2</td>
<td>11.11%</td>
<td>863</td>
<td>11.69%</td>
<td>2.00</td>
<td>0.165</td>
<td>0.10</td>
<td>61.50</td>
</tr>
<tr>
<td>Amphorae</td>
<td>-</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td>25</td>
<td>6.48%</td>
<td>-</td>
<td>-</td>
<td>486</td>
<td>6.58%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dolia</td>
<td>3</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>6.48%</td>
<td>3</td>
<td>16.67%</td>
<td>1889</td>
<td>25.59%</td>
<td>0.25</td>
<td>0.069</td>
<td>0.08</td>
<td>100.00</td>
</tr>
<tr>
<td>Mortaria</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>1</td>
<td>128</td>
<td>33.16%</td>
<td>3</td>
<td>16.67%</td>
<td>1283</td>
<td>17.38%</td>
<td>0.26</td>
<td>0.064</td>
<td>0.09</td>
<td>46.15</td>
</tr>
<tr>
<td>Coarse ware</td>
<td>8</td>
<td>113</td>
<td>6</td>
<td>1</td>
<td>128</td>
<td>33.16%</td>
<td>5</td>
<td>27.78%</td>
<td>1988</td>
<td>26.93%</td>
<td>0.95</td>
<td>0.238</td>
<td>0.19</td>
<td>134.74</td>
</tr>
<tr>
<td>Cork ware</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>0.26%</td>
<td>1</td>
<td>5.56%</td>
<td>37</td>
<td>0.50%</td>
<td>0.10</td>
<td>0.025</td>
<td>0.10</td>
<td>10.00</td>
</tr>
<tr>
<td>Handmade pottery</td>
<td>1</td>
<td>20</td>
<td>1</td>
<td>-</td>
<td>22</td>
<td>5.70%</td>
<td>1</td>
<td>5.56%</td>
<td>525</td>
<td>7.11%</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
<td>183.33</td>
</tr>
<tr>
<td>Unknown</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>0.26%</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>0.14%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>340</td>
<td>14</td>
<td>8</td>
<td>386</td>
<td>100.00%</td>
<td>18</td>
<td>100.00%</td>
<td>7381</td>
<td>100.00%</td>
<td>3.99</td>
<td>100%</td>
<td>0.22</td>
<td>109.23</td>
</tr>
</tbody>
</table>

Terra sigillata

*Terra sigillata* or Samian ware is the common term used to describe a variety of types of (luxury) tableware. The fabric can differ in colour from yellowish to orange to red. The colour of the gloss is orange to red. *Terra sigillata* can be subdivided into plain ware and decorated ware based on the two different methods of production. Plain ware is made on the potters’ wheel with help from shaped burnishing tools or templates.\(^{11}\) Sometimes barbotine leaves or figures are added, as are rouletted designs. Decorated ware is made in moulds.\(^{12}\) Sometimes the vessels are stamped with the names of the workshops and/or the people that worked in them. The plain vessels are usually stamped on the interior of the base. On decorated vessels the stamps can appear on a variety of places.\(^{13}\) *Terra sigillata* is produced in a variety of production centres.

Five fragments of *terra sigillata* were present (MNI = 2). This comprises 1.30% of the total number of fragments. The weight was 91 g. All fragments were produced in Southern Gaul. Two different forms were observed. Four fragments belonged to a plate Dragendorff 15/17. This form dates in the first century AD, but mainly in the pre-Flavian period (before AD 70).\(^{14}\) One fragment belonged to a bowl Dragendorff 29. This form dates upwards to ca AD 85/90.\(^{15}\)

Terra nigra

*Terra nigra* is fired in a reducing atmosphere. In combination with the type of clay used for *terra nigra*, this leads to a grey to dark grey break. The exterior surface is usually black and polished. Because of this the surface becomes less porous.\(^{16}\) *Terra nigra* can be divided into three groups. The first group is relatively thin-walled, soft and smooth surfaced. The surface is black and polished. The second group is harder and the surface

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12  Webster 1996, 5.
13  Webster 1996, 7-9.
14  Hiddink 2010, 38; Webster 1996, 30.
15  Hiddink 2010, 54; Webster 1996, 74-75.
16  Van Enckevort 2004, 287.
is less smooth. The third group is light to dark grey and sometimes has a metallic shine. Its core is white to light grey.

In total 48 fragments of *terra nigra* were analysed (MNI = 2). This amounts to 12.44% of the total number of fragments. The total weight was 105 g. Two different types were observed. One rim fragment possibly belongs to a Holwerda BW 3/11. This type of beaker is pre-Flavian (before AD 70). Two rim fragments belong to one example of Holwerda BW 81. This dish dates from the beginning of the first century AD to ca AD 150.

**Colour-coated ware**

Colour-coated pottery is made by submersing a vessel in a paint bath, although sometimes vessels are painted with a brush or sponge. In the Netherlands several fabrics were distinguished by H. Brunsting. Only those that were found during this excavation will be discussed here:

- Brunsting a: white core with an (red) orange to brown, sometimes yellow coating. Mostly beakers and dishes were produced in this fabric. Beakers generally date to the first century AD and dishes to the second century, sometimes the early third century. This fabric was produced in the Rhineland area, among others in Cologne, Xanten and Nijmegen.
- Brunsting b: white core with a matt brown to black coating. Among others, beakers, dishes and jugs were made in this fabric. The vessels date in the second and third centuries. They were produced in the Lower Rhineland area, among others in Cologne.
- Brunsting c: red or orange core with a matt brown to black coating. Usually only beakers were produced in this fabric. They generally date from the middle of the second century on and were mostly made in the Argonne and Trier.

Colour-coated vessels can be decorated with a variety of different motives, but no fragments with decoration were found in this complex.

The excavation yielded only 11 wall fragments of colour-coated ware. This is 2.85% of the total amount of fragments. Their total weight was 104 g and the fragments were quite fragmented. All three fabrics mentioned above were observed (Table 16.2). None of the fragments could be identified as a specific type because all were wall fragments. It is probable though that all derive from beakers.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Provenance</th>
<th>N</th>
<th>N%</th>
<th>MNI</th>
<th>MNI%</th>
<th>Weight</th>
<th>Weight%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunsting a</td>
<td>Rhineland</td>
<td>3</td>
<td>27.27%</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>12.50%</td>
</tr>
<tr>
<td>Brunsting b</td>
<td>Rhineland</td>
<td>7</td>
<td>63.64%</td>
<td>-</td>
<td>-</td>
<td>87</td>
<td>83.65%</td>
</tr>
<tr>
<td>Brunsting c</td>
<td>Argonne/Trier</td>
<td>1</td>
<td>9.09%</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>3.85%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>11</td>
<td><strong>100.00%</strong></td>
<td>-</td>
<td>-</td>
<td><strong>104</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

**Smooth ware**

This fabric is made of a very fine, white to light orange to beige clay. The surface is smoothened by a stone or a spatula made from wood, bone or metal. This smoothening was presumably done to lessen the permeability of the fabric. In addition to this, the clay was washed, so the fabric contains (almost) no impurities. This was done while the vessel was being made on the potter’s wheel; therefore horizontal

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17 Holwerda 1944, 18 en 23; Hiddink 2010, 62-64.
19 Brunsting 1937, 70-72.
bands are sometimes visible on the outer surface. Several vessel types are made in this fabric. These include handled jugs (both one and two handles), honey jars and lids. Smooth ware vessels were among others produced in the Rhineland area and the Meuse region. Sometimes the vessels are smoked. Their surface is brown, grey-brownish or almost black, due to the shutting off of the oxygen supply within the kiln during the firing process. This particular firing process was current from the late second century onwards, mainly in production centres in the Meuse area such as Tienen. 20

In total 123 fragments of the smooth ware fabric were observed during the analysis (MNI = 2). This amounts to 31.87% of all the fragments. The total weight was 863 g (Table 16.3).

23 fragments belonged to a Stuart 110a jug with a twofold handle. These jugs generally date from the end of first century to the third quarter of the second century. 21 A second twofold handle as well as a fourfold handle were also observed. The former possibly belongs to the Stuart 110a jug as well. One rim fragment belonged to a jug Stuart 107, which dates from the last quarter of the first century to the beginning of the second century. 22 The fabric of some of the fragments could be identified. 25 fragments were made in oxidised ware from the Meuse area. 73 fragments were made in oxidised ware from either the Meuse area or the Rhineland. One fragment originated from the Rhineland. Decoration with rouletting was observed on one fragment.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>N%</th>
<th>MNI</th>
<th>MNI%</th>
<th>Weight</th>
<th>Weight%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidised ware Meuse area</td>
<td>25</td>
<td>20.33%</td>
<td>-</td>
<td>-</td>
<td>201</td>
<td>23.29%</td>
</tr>
<tr>
<td>Oxidised ware Meuse area/Rhineland</td>
<td>73</td>
<td>59.35%</td>
<td>1</td>
<td>50.00%</td>
<td>413</td>
<td>47.86%</td>
</tr>
<tr>
<td>Oxidised ware Rhineland</td>
<td>1</td>
<td>0.81%</td>
<td>1</td>
<td>50.00%</td>
<td>70</td>
<td>8.11%</td>
</tr>
<tr>
<td>Oxidised ware</td>
<td>24</td>
<td>19.51%</td>
<td>-</td>
<td>-</td>
<td>179</td>
<td>20.74%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>123</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>2</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>863</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

Amphorae

Amphorae are big transport containers. They were used for (semi) fluids like wine, fish sauce or olive oil. Fragments of amphorae can be identified as a specific type by looking at the fabric and provenance. Areas specialised in certain products. For example, wine came from Gaul and olive oil from Baetica. Amphorae are relatively rare on sites in the south of the Netherlands. Most fragments belong either to Dressel 20 olive oil amphorae or Gauloise wine amphorae. 23 Sometimes amphorae are endowed with stamps, graffiti or tituli picti. If they are readable, these can tell us something about the content or capacity of the amphora, or about the potter.

Ten fragments of amphora fabric were observed, 2.59% of the total amount of fragments analysed. The total weight was 486 g. Two fragments of a twofold handle could be refitted and are made in the North-Gaulish fabric. The fabrics of another handle and the other fragments are of unknown provenance.

22 Stuart 1963, 41; Haalebos 1990, 158.
**Dolia**

*Dolia* are big storage pots with a flat and horizontal rim that were used for storing products like wine, oil, water and grain. The rim is sometimes covered with a black substance on both the inside and the outside. This may have served to attach a (wooden) lid or a cloth to seal of the vessel. The *dolium* fabric is usually yellow-brown to grey-brown and tempered with grog. The tempering sometimes contains reddish particles, which look like crushed Roman roofing or floor tiles, or secondary burned pottery. Some *dolia* are decorated with notches or grooves, probably to imitate ropes. *Dolia* are probably made by stacking rolls of clay on top of each other, while slowly turning the potter’s wheel. The rim is probably the only part of the vessel that is made completely on the fast turning potter’s wheel. Unfortunately there is no chronological development visible in *dolia*, so they are not useful while dating contexts.  

25 fragments of the *dolia* fabric were analysed (MNI = 3). This amounts to 6.48 % of the total number of fragments analysed. The total weight was 1889 g. Three rim fragments belonged to the Stuart 147 type, one of these was wheel-thrown. This type was produced during the entire Roman Period, but dates mainly from the first to the third century. Different fabrics were observed, but due to lack of knowledge none could be specified.

**Mortaria**

A *mortarium* can be compared to a modern mortar and pestle. They were probably used to pulverize ingredients for things like sauces, as is indicated by little stones or mortar that roughened the inside surface. Other possible uses are to separate chaff from wheat, to knead dough or to make porridge. The latter could explain the large numbers of *mortaria* in military contexts: a soldier would have had to prepare his daily portion of grain and porridge in his own personal *mortarium*. Some *mortaria* are not roughened and might have been used as milk bowls. Stamps on the rim are sometimes found on *mortaria*.

12 fragments of the *mortaria* fabric were found (MNI = 3). This amounts to 3.11 % of the whole analysed complex. The total weight was 1283 g. Two different types were observed. One rim fragment belonged to a Brunsting 37. This type dates from the middle of the second century onwards. Two rim and seven wall fragments belonged to a Stuart 149. This type dates from AD 40 onwards.

**Coarse ware**

Coarse ware fabrics are made with clay that is tempered with sand or fine pebble-sand. Consequently the surface and the break of the vessels are coarse. Sometimes the fabric is rather crumbly and can feel like sandpaper. The colour of the different coarse ware fabrics can differ from white to beige, yellow to brown, orange to red, and grey. These vessels are typically used in everyday life: pots, bowls, beakers, dishes and jugs. Their function can vary from transport vessel to cooking pot to storage pot.

We observed 128 fragments. This is 33.16 % of the total number of analysed fragments. The MNI was five and the total weight 1988 g (Table 16.4).

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26 Vanderhoeven 1989, 14.  
Four different types and one twofold handle were identified. Two rim fragments belonged to a Stuart 201a pot (MNI = 2), dating from the first to the third centuries AD. An Oelmann 120 lid was also observed. These lids date in the entire Roman Period. Four reduced rim fragments were difficult to identify. Dating was therefore not possible. The rim was thickened and inward standing. The closest possible parallel was Hiddink 2010 type B in grey ware. A reduced bowl with an S-shaped profile was identified as well. This bowl was similar to Holwerda BW 55 which dates from the end of the first century to the end of the second century. It can also be compared to type J in grey ware from Hiddink 2010. In Collins et al. this type of bowl in Batavian grey ware is dated from the beginning of the Flavian period onward. Vilvorder states that these bowls (jatte J1) date from the Flavian period, but are most popular in the second century AD.

In only four cases the specific fabric could be identified. Three fragments were made of reduced Lowlands ware and one fragment was oxidised ware from the Meuse area. Two fragments were decorated with small notches, five other fragments with grooves encircling the vessels.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>N</th>
<th>N%</th>
<th>MNI</th>
<th>MNI%</th>
<th>Weight</th>
<th>Weight%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced Lowlands ware 1</td>
<td>3</td>
<td>2.34%</td>
<td>-</td>
<td>-</td>
<td>56</td>
<td>2.82%</td>
</tr>
<tr>
<td>Oxidised ware Meuse area</td>
<td>1</td>
<td>0.78%</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>0.65%</td>
</tr>
<tr>
<td>Oxidised ware</td>
<td>73</td>
<td>57.03%</td>
<td>2</td>
<td>40.00%</td>
<td>1458</td>
<td>73.34%</td>
</tr>
<tr>
<td>Reduced ware</td>
<td>51</td>
<td>39.84%</td>
<td>3</td>
<td>60.00%</td>
<td>461</td>
<td>23.19%</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>100.00%</td>
<td>5</td>
<td>100.00%</td>
<td>1988</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Haltener Kochtöpfe or ‘cork urns’

These types of vessels are named ‘cork urns’ because their fabric resembles cork. They are also known as Haltener Kochtöpfe. The fabric can be recognised by its many small indentations that appear when the chalk that was used as tempering material burns away during the firing of the vessels. The chalk sometimes remains visible on the break. The fabric can be either hard or soft and has a black to very dark brown break. The surface is sometimes roughened with a brush. Often the rim is endowed with a thin, black paint.

One rim fragment of cork urn was observed (MNI = 1). This is 0.27 % of the total amount of fragments. The weight was 37 g. The fragment was identified as a Holwerda BW 94 pot. This type dates mainly in the first three quarters of the first century AD, but can date up to ca AD 125.

Handmade pottery

Lastly, 22 fragments of handmade pottery were observed, including one rim fragment. This is 5.70 % of the total number of fragments. The weight was 525 g. Due to lack of knowledge these fragments could not be dated more precisely than either to the Iron Age or the Roman Period.

31 Oelmann 1914, 80; Hiddink 2010, 148.
34 Hiddink 2010, 174-175.
36 Vilvorder 2001, 304-305.
37 Hiddink 2010, 60.
38 Holwerda 1941, 75.
39 Holwerda 1941, 75-77; Hiddink 2010, 76.
16.1.3 Contexts and dating

Most of the Roman-period pottery was found in features that probably belong to a small rural settlement. Three postholes have been interpreted as roof-bearing posts of a house plan. Only one of these postholes (feature 1663) yielded pottery, e.g. two small wall fragments of coarse ware that could not be dated more accurately than ‘Roman Period’. A cluster of pits (features 2483, 2484, 2485) probably represents one context and was interpreted in the field as a watering trough. This context yielded 46 fragments (MNI = 6), one of which was the cork urn Holwerda BW 94, dating in the first three quarters of the first century AD. Two rim fragments belonged to two dolia of the type Stuart 147. These date in the first three centuries AD. Both the terra sigillata types were also found in this context: the Dragendorff 15/17 dating mainly in the pre-Flavian period and the Dragendorff 29 dating to ca AD 85/90. The fragment of a jug Stuart 107 dates from the last quarter of the first century to the beginning of the second century. Lastly, three fragments of a mortarium Stuart 149 were also found in this context. These fragments dated from AD 40 onwards. The upper fills of the Late Iron Age ditch with a V-shaped cross-section also contained some Roman-period pottery. All of the Roman-period pottery from this ditch was recovered from the area near the Roman house plan and pits. The material comprises 161 fragments (MNI = 3), including six rim fragments of three different types. One fragment belonged to the reduced bowl similar to Holwerda BW 55 (Flavian period to the end of the second century) and one fragment to a dolium Stuart 147 (first to end of third century). The last four fragments were the unidentified reduced rims.

If we look at the entire assemblage of Roman pottery we can roughly date it between the second half / late first century AD to the middle of the second century AD, or a little after. Because of the small amount of fragments we cannot be more precise. Particularly the Holwerda BW 3/11 and 94 and the Dragendorff 15/17 and 29 fragments point towards an early date. In addition, Holwerda BW 35 and 81, and Stuart 107 and 110a can also be dated early. At the same time the presence of the colour-coated fabrics Brunsting a and b point towards this date. The presence of a Brunsting 37 mortarium provides us with a final date around the middle of the second century.

16.2 Metal

Lucas Meurkens

A small quantity of metal objects was found during the excavation. Four objects could be dated to the Roman Period based on the type of object. In addition, three metal objects have been dated to this period based on their presence in Roman features. It concerns three iron nails from respectively pits 2475 (N=2) and 2484 (N=1). In watering trough 2483, a small thin twisted bar of a copper alloy was found.

The objects that were dated through typology were recovered from the upper soil horizons removed during the mechanical levelling of excavation area. These copper alloy objects can be described as follows:

- Fig. 4: A fragment of a fibula. It concerns a large part of the bow and a fragment of the spring. The pin and pinrest have broken off. The bow has a lozenge-shaped cross-section and has been decorated at the top with small notches. According to Haalebos this type of fibula was chiefly worn in the region of Heerlen and dated AD 70-200.40

- Fnr. 397: Part of the bow and the spring of a fibula that can probably be ascribed to a so-called Knee fibula with protective spring-cover considering the protective cover around the spring. Fibulas of this type were worn from the second quarter of the 2nd century to into the 3rd century. They occur mainly along the Rhine and are often regarded as typical of military attire. However according to Haalebos it is quite possible that they were worn by civilians.\textsuperscript{41}
- Fnr. 398: Knob of a bracelet
- Fnr. 399: Fragment of a fibula.

The metal finds from the Roman Period can be regarded as typical of an indigenous Roman settlement. They comprise different fragments of fibulae (i.e. brooches) that are frequently found at Roman findspots. In addition a fragment of a bracelet was found. The metal finds probably date to the end of the first century or to the second century.

\textbf{Figure 16.1}
Fragment of a fibula (Fnr 4; top) and Fragment of a knee fibula (Fnr 397; bottom).

16.3 Stone

\textit{Annemieke Verbaas}

The amount of stones from the Roman era is relatively low compared to the finds from the LBK and Iron Age (N=80; 50\% heated (Table 16.5). They mainly include unmodified or broken pieces of stone. Only three artefacts could be described as tools, two grinding stones and a quern fragment. The quern fragment is one half of a set of a rotating hand mills made of vesicular basalt. Several pieces of vesicular basalt were found besides the quern of vesicular basalt. These indicate the presence of more querns. The marl finds consist of several small but also very large blocks. The blocks of marl were not studied for traces of modification. Finally a fragment of an extensively shaped grinding stone was found.

\textsuperscript{41} Haalebos 1986, 55.
Fifteen finds (67% heated) were connected to a house structure (structure 54). None of these are modified. Six pieces of marl, which show traces of burning, are connected to the construction of fundaments of the house. They were found in the central posts of the structure.

Table 16.5
Overview of Roman finds.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number</td>
<td>80</td>
<td>100.0</td>
</tr>
<tr>
<td>Heated</td>
<td>40</td>
<td>50.0</td>
</tr>
<tr>
<td>Total tools</td>
<td>3</td>
<td>3.8</td>
</tr>
<tr>
<td>Quern</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Grinding Stone</td>
<td>2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Figure 16.1
Fragment of a rotating hand mill of vesicular basalt (Findnumber 170).
The modern period (16th-20th century)

Ivo van Wijk

17.1 Introduction

The research area consisted mostly of prehistoric and Roman remains. The abandonment of the Cannerberg during the Roman Period, however, did not constitute the end of the cultural biography of the Cannerberg. We observed evidence for post medieval use of the Cannerberg that points out single, relatively short termed, events in the 16th-18th century and WWII. These events emphasize the strategic importance of the Cannerberg. An overview is provided of the most noteworthy remains.

17.2 16th-18th century ditches

During the test trenching campaign ca. 80 shallow ditches were found which initially were believed to be sub recent field boundaries. As the excavation started it became clear that these ditches could have had another function as well. The ditches cover an area of circa 340 by 250 m and are found along the western and southern edge of the excavation. The eastern and central area is almost without any ditches. The ditches vary in length between 6 and 16 m with an average length of about 10 m. The variation in width is much smaller and ranges from 0.5 to 0.9 m with an average of 0.7 m. About 10 ditches have been sectioned and they range in depth from 8 to 14 cm. The colour of the homogeneous filling is dark greyish brown and seems to indicate a gradual filling. Most of them are north-south orientated or have a perpendicular east-west orientation. In total 48 finds were retrieved (Table 17.1) including 16th-18th century pottery, flint, stones as well as Prehistoric and Roman pottery. The older finds have to be regarded as intrusions as the ditches have cut through older features.

<table>
<thead>
<tr>
<th>Material</th>
<th>Amount</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern pottery</td>
<td>10</td>
<td>57.4</td>
</tr>
<tr>
<td>Iron Age pottery</td>
<td>1</td>
<td>15.1</td>
</tr>
<tr>
<td>Roman pottery</td>
<td>1</td>
<td>12.4</td>
</tr>
<tr>
<td>Bricks</td>
<td>1</td>
<td>105.1</td>
</tr>
<tr>
<td>Flint</td>
<td>27</td>
<td>1176.8</td>
</tr>
<tr>
<td>Stone</td>
<td>8</td>
<td>567.7</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the function of the ditches several explanations are possible. On Dutch loess soils comparable concentrations of ditches have not been excavated which suggests that they have to be considered a local phenomenon. Excavations in Belgium at Lanaken-Europark\(^1\) did yield more or less the same type of features. They were interpreted as soil improvement ditches that were dug in either a southeast-northwest or northeast-southwest orientation. Two distinct zones were recognized where the ditches had either a southeast-northwest or northeast-southwest orientation.\(^2\) Due to the large spacing and rigid orientation between the various ditches at the Cannerberg an explanation as soil improvement ditches seems to be somewhat farfetched. Another explanation is that these ditches were cadastral boundaries or internal divisions within various plots.\(^3\) However, it must be noted that during a test trenching campaign in

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Figure 17.1
Distribution of (sub) recent features.
The Modern period

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an adjacent research area of the Europark these ditches have not been found. Both explanations therefore seem to be unsatisfactory suggesting that these kinds of practices are commonly observed.

It is important to focus on the distribution of the ditches. They are distributed over distinct areas of the research area and appear to envelope the highest part of the research area. A suggestion is that these ditches were dug as strategic defences of the Cannerberg. The Maastricht area has been subjected to various sieges from the Medieval Period onwards (§4.4). The Cannerberg played a strategic role in these sieges also. Worth mentioning are the sieges by Frederick Henry in 1632 (Figure 17.3) and Louis XIV in 1673 (Figure 17.4), as well as the Battle of Laeffelt in 1748 (Figure 17.5).

On the historical maps troops and fortifications are visible on the Cannerberg. It could be that the ditches, which reached down ca. 50-80 cm from the topsoil, were dug by sappers to hide from enemy fire. Drawings from these historical battles show how the trenches were dug (Figure 17.6) and how deep they reached (3 ft) which coincides with the depth of the excavated ditches. Unfortunately there are no finds to support this thesis. During the excavation only one musket bullet was found. There are no other remains which indicate a substantial stay of troops at the Cannerberg, for example hearts or refuse pits. At the Lanaken excavation these features and finds were indeed present. But in this case, part of an active frontline was positioned at the same area where the excavation was. In the neighbouring Lanakerveld almost no indications of this siege were found apart from the find of a single cannonball and traces of its impact.

5 Ubachs & Evers 2005.
6 Ubachs & Evers, 2006, p.141.
7 Dyselinck 2009, 55-63.
8 Meurkens & Van Wijk 2009, 280 (figure 5.4).
Figure 17.3
Siege of Maastricht by Frederick Henry in 1632 (Ubaghs & Evers 2005).

Figure 17.4
Map of 1673 showing the circumvallation works by the army of Louis XIV of France that isolated the besieged city of Maastricht and forced it to surrender after two weeks (Ubaghs & Evers 2006).
Figure 17.5
The Battle of Laeffelt (gravure 'Plan de bataille de Laffelt' fait par F.K. en service de sa Majesté Brittanique).

Figure 17.6
Military instruction drawing about the art of trench digging (De Vauban 1737-1742).
17.3 Fort de Jeker

Based on LiDAR research the position of one of the fortifications from the siege of 1632 was recovered. The image (Figure 17.7) shows a fortification made of two fosses at the western side and a single fosse on the eastern side where the slope was the steepest. Between the fosses an earthen wall was erected.

On the map of the siege of 1632 (Figure 17.3 and Figure 17.8) fortifications are visible at the Cannerberg whose shape resembles the outlines visible on the LiDAR image. It is very likely that they are the visible remains of ‘Fort de Jeker’. It was build by the 10.000 men strong army of Prince Frederik Hendrik, who was the sovereign Prince of Orange, in order to prepare for the siege of Maastricht which was in Spanish hands by that time. The fortifications that surrounded Maastricht were constructed by Frederik’s main engineer Perceval. In the literature some remarks were made about the speed and size of the construction of the fortification. Both diggers and soldiers worked together on the constructions in such a hurry that most of them were ready to defend within a day.\(^9\) The ditches were six feet deep and wide. In total it took just five days to complete the fortifications.

Along the ridge of the Cannerberg more ditches can be seen on the LiDAR image. However, without more intensive research it remains unclear if they also belong to the extensive fortifications. The remains of the fortifications are one of the scarce remnants of the Eighty Years’ War or Dutch War of Independence (1568–1648) in Maastricht.

\(^9\) Le Clerq 1738, 536-537.
17.4 Medieval and modern pottery

Michiel Goddijn

The pottery was scanned to determine the fabric. The amount pottery from these periods is very limited (22 sherds) therefore the analysis will be emphasized on the dating. The condition of the pottery was very bad. The sherds were very small and a lot of them had a weather-beaten appearance indicating that they have been lying around in the topsoil.

The oldest sherd found is Paffrath-pottery dating from the 11\textsuperscript{th} to 12\textsuperscript{th} century. This piece was found in a pit with an early Neolithic date (s1302). Some other sherds (4 fragments) were also found in prehistoric features (s2140 and s2210). These sherds have to be considered as intrusions by animal life or recent activities like ploughing the soil.

Three sherds were found in two more recent ditches (s1999 and s2079). These probably date between 1600 and 1800. One of the sherds (“witbakkend”) is from the late medieval period but this has been weather-beaten and probably has to be considered an intrusion.
17.5 A natural phenomenon or a double ditch system?

In the southern stretch of the excavation a peculiar set of features were found (Figure 17.1). It consisted of two ditches which marked a drop in relief in the landscape. The length of the two ditches reaches over 200 m and was visible in various trenches. The two ditches cut over a late Iron Age or Roman ditch which indicates that these features were younger. This is supported by the finds retrieved from these ditches. They contain industrial white ware which got into fashion from 1725 onwards.

When sectioning the ditches (Figure 17.9) it became clear that the southern ditch was recently dug as the incision comes just under the topsoil. The southern ditch is asymmetrical V-shaped and reaches down for almost two m. The northern ditch on the other hand lacks the typical V-shaped and looks more organic. It has however the same depth and (colour of) filling as the southern ditch. The width of the ditches varies between 0.4 and 0.8 m. The function of the double ditch remains obscure. As a defensive system the ditches seem to be too small although their depth provides an issue when trying to cross. A function as plot boundary seems to be farfetched as well. An explanation might be that this is a recent natural phenomenon where cracks in the land could arise in case of an earthquake or where a piece of land 'sinks' because of the disolvement of calceous layers in the deeper underground. This local phenomenon is generally known and the eventual natural endresult is called 'doline' or sinkhole. In the Cannerberg forest multiple smaller dolines are visible. Whether the excavated ditches are indeed the results of a very large sinkhole remains uncertain.
17.6 WWII remains

A number of finds indicate that during World War II the Cannerberg played a modest role as strategic defence and resting place. During the test trenching campaign some weights originating from British 4 lbs incendiary cluster bombs were found. As a result the whole research area was checked for explosives. An incendiary cluster bomb consisted of a hollow body made from aluminium-magnesium alloy with a cast iron/steel nose, and filled with thermite incendiary pellets. It was capable of burning for up to ten minutes. There was also a high explosive version and delayed high explosive version (2–4 minutes) which were specifically designed to kill rescuers and fire-fighters. Over 260 remnants of these British 4 lbs incendiary bombs were secured by an explosives detection company (AVG). The Cannerberg apparently was a target for an aerial raid.

Local farmers informed the authorities that German artillery positions were located within the research area. However, during the excavation no traces were found of any artillery positions. According to historic maps there should have been Dutch artillery positions present within the research area but none have been located. Only one pit (pit 370) yielded some German rifle bullets. Moreover, small arms munitions were found elsewhere in the research area. It is unclear if the incendiary bombs were dropped in the starting days of the war (May 10th 1940) when the Germans tried to conquer and cross the bridge at Vroenhoven as part of operation ‘Fall Gelb’ and Allied bombers tried to bomb the bridge in order to halt the German advance. They could also have been dropped in during a later phase, when allied forces pushed on to Maastricht (September 9-14th 1944) and the Germans retreated after the failed ‘Battle of the Bulge’ campaign.

Most war related action took place when German Fallschirmjäger or airborne troops from ‘Sturmarteilung Koch’ (or specifically ‘Sturmgruppe Eisen’) tried to conquer the bridge near Vroenhoven and Veldwezelt as well as the Belgium fort Eben-Emael as they were of critical tactical need for the advance of the German 6th Army. On May 11th 1940 the British RAF and the Belgian air force in combination with artillery barrages tried to destroy the bridge but they were unable to hit the bridge thanks to heavy flak and the Luftwaffe. Only one bomb hit the bridge and caused some damage to the road surface.

10 RAF Bomber Command dropped 80,000,000 of 4 lb incendiary bombs during World War II.  
12 Brongers, oorlog in Zuid-Limburg.
In 1944 the Germans dug trenches along the eastern border of the Albert Canal which were shelled constantly by the allied forces.\textsuperscript{13} It is also possible that the presumed German artillery positions were shelled. Another possibility for the strike with incendiary bombs are the tunnels in the Cannerberg which were marked in 1944 as a target. These tunnels harboured a V1 missiles assembly factory and between 1954 and 1992 these tunnels became the secret underground headquarter of the NATO. The air vents are still visible within the research area and are surrounded by bushes which are easy to spot on aerial photographs.

It is strange however that although such a high amount of firebombs were dropped, which certainly should have had a visual impact on the surrounding communities of Wolder and Kanne, no records refer to this event. There are only some indications that V1 or V2 flying bombs crashed in the vicinity of Canne on September 29\textsuperscript{13}. The Maastricht air watch noted that at 12h30 a blast was witnessed in the woods near Kanne and at 18h50 heavy blasts were heard behind the Kannerbos. There are several occasions when the incendiary cluster bombs could have been dropped but it remains unknown when it happened. It also can be the result of an emergency discard from a bomber in need who tried to discharge without casualties and lighten the load during the flight.

In the northern part of the excavation two pits (862 and 863) were found which held the remains of Allied refuse that was discarded in these pits. The refuse consisted of pieces of fabric, fragments of English newspapers, paint cans (green paint), glass bottles, fragments of a field heater, coal, a pair of scissors and other pieces of metal. The finds are interpreted as the remains of an allied camp site, presumably from the 120\textsuperscript{th} Infantry Regiment.\textsuperscript{14}

\textsuperscript{13} https://nl.wikipedia.org/wiki/Geschiedenis_van_Wolder.
\textsuperscript{14} Disch 1997, 37.
Conclusion

The excavation made clear that after the Roman Period no long lasting activities took place on the Cannerberg. During late medieval and modern times the area was visited frequently, especially as a battle scene. Soldiers from late medieval times and onwards must have trodden these grounds and sometimes left marks in the landscape. These marks are represented by the fragments of firebombs and newspaper fragments during WW2 or even by defensive trenches dug while the city of Maastricht was under siege. Whatever the explanation of these trenches or ditches might be in relationship to combat activities it is clear that the Cannerberg was solely a barren landscape. But only small parts of the research area have been cultivated in late medieval times. It might offer an explanation why hardly any medieval finds were found in the topsoil as they are mostly an indication of the start of cultivation within these parts. Most of the area probably remained woodland until the early 20th century when large fields
were cultivated. The cultivation of the Cannerberg eventually revealed the prehistoric relevance of the Cannerberg as amateur archaeologist got a chance to survey the cultivated fields and revealed its riches.
Conclusions and synthesis

Ivo van Wijk

18.1 Getting acquainted with archaeological sites on the Cannerberg

The research area is situated on the southern part of the Cannerberg, also named Louwberg. The area is circa 7 ha large and is primarily used for agriculture. The Cannerberg is situated on a loess-covered upper terrace formed by the River Meuse during the Pleistocene. The Cannerberg is bordered on its eastern side by a steep drop (height difference of 50 m) to the valley of the Jeker/Geer but on the western side the upper terrace gently slopes down to the middle terrace.

The excavations at the Cannerberg in the summer of 2013 were preceded by a short test trenching campaign in the winter of 2012. Test trenching showed the potential for archaeological research: the subsoil of the Cannerberg harboured the remains of settlements dating to the Early Neolithic, Iron Age and Roman eras. Most evident are the remains of a Bandkeramik settlement covering almost the entire research area. The settlement was preliminary dated to the youngest phases of the LBK. Its location is atypical for most Dutch LBK sites are usually situated on the middle terrace and not on the upper terrace as the Cannerberg site is. It is not until the Younger LBK that settlements were situated on the higher grounds. The Cannerberg settlement is one of the higher located and relatively unknown settlements. Geographically the site belongs to the Heeswater settlement cluster, a group of LBK settlements along the Heeswater brook and the Jeker/Geer. With their sources further west in Belgium, these streams originally drained into the Meuse River.

The excavation yielded several Iron Age house plans representing various yards. The Roman site consists of a few postholes, pits, a ditch and a find layer. The scarce number of features provides little information as to the presumed character of the site, probably a rural settlement. Furthermore, the site also harboured remains that stressed the strategic position of the Cannerberg dating back to the modern period (16th-18th century and WWII).

18.2 A landscape archaeological approach

The extent of the area, position on an elevated plot next to a valley and its high archaeological values made the Cannerberg suitable for a landscape archaeological approach in order to get more insight in the cultural landscape around Maastricht. We focussed on the position, use and structuring of various elements like the landscape, settlement, activity areas and depositions, by investigating the spatial distributions of anthropogenic features and find material, both horizontally and vertically, describing and interpreting quantitative and qualitative characteristics of these patterns. This sometimes proved to be too far-fetched because of the enormous amount of data as well as the limitations of the budget. Nonetheless we feel we have met with the tasks we have set upon us.

1 De Grooth 2007; Van Wijk in prep.
18.3 The biography of the Cannerberg: the Bandkeramik settlement

*Ivo van Wijk, Pieter van de Velde, Sebastiaan Knippenberg & Annemieke Verbaas*

18.3.1 Introduction

Almost half of the research area (3.5 ha) has been excavated, revealing the outlines of a small Bandkeramik village, consisting of at least 29 house yards. Based on test trenching the structure of the settlement was thought to have an open layout. This contrasts with most Dutch LBK settlements such as Elsloo, Stein and Sittard, which are “high density” settlements inhabited from the Early through to the Late LBK and which yielded many house plans. The characteristics of the Cannerberg settlement will be discussed below and compared with known sites in the region.

18.3.2 House structures

In total 29 house yards have been reconstructed. The house structures at the Cannerberg settlement are oriented east to west and consist mostly of Modderman-type 2 houses. These are two prominent features, both in orientation and in type, that distinguish this site from other known LBK settlements in the Euregion. Other sites have a wider range of house types and the general orientation is north-east to south-west.

On the Cannerberg most house plans were incomplete due to poor visibility. However, with the aid of Modderman's typology\(^3\) we have been able to determine the types of 16 house plans, of which 14 with a high degree of confidence. Their distribution is as follows: one possible type 1b-house, 10-12 type 2 houses and 4 or 5 type 3 houses. The number of type 2 and type 3 houses within this settlement is substantially higher than in most other LBK settlements. Fourteen houses are rectangularly shaped and six houses have a slightly trapezoidal shape. The orientations of the house plans on the Cannerberg vary from NW-SE (32°) to W-E (94°) averaging ESE-WNW (108°). The type 2 and type 3 houses have almost the same variation in their orientations. A variation is also witnessed for the house shapes or the phases of habitation. Most remarkable however, is that the main house orientation differs from other Dutch LBK settlements; all settlements in the Meuse-Rhine Euregion have a more NW-SE orientation.

Nineteen houses (out of 29) could be assigned directly to a ceramic phase based on their accompanying pottery decoration. One house could be dated as it was positioned over an older houseplan. We attributed phase 9 through phase 20 or Modderman phases 1d to 2d to the Cannerberg houses. Chronologically, the houses are evenly distributed, with about two or three houses per ceramic phase. This suggests that five different habitation phases existed. We believe that the settlement consisted of three or four different house yards per ceramic or habitation phase if we incorporate undated and unexcavated houses.

The typology of the houses implies no social stratification: large, tripartite houses are missing. This lack of type 1b longhouses distinguishes the Cannerberg site from other sites in the Euregion. An inventory of houses for all Belgian sites by Jadin\(^4\) shows the

\(^3\) Modderman 1970.
\(^4\) Jadin 2003, 303-305 table 2.9.
Figure 18.1
following distribution of the types: type 1a: 3 instances, type 1b: 39, type 2: 28 and type 3: 5.\(^5\) The type 1b house dominates the Belgian and Dutch sites. Most houses (n=41) of the Heeswater cluster are tripartite (Figure 18.1). Settlements on the Aldenhovener Platte in the Rhineland have the same predominance of tripartite houses.

The near absence of this type of houses or at the least their underrepresentation at the Cannerberg settlement is therefore highly atypical for Bandkeramik settlements in the Euregion. Interestingly, the orientations of the houses on the Cannerberg fit perfectly in the main orientation of houses in the Hesbaye which averages between E-W and WNW-ESE.\(^6\) The same applies to the average length and width of the Hesbaye houses.\(^7\) Regarding the building practises it can be concluded that the Cannerberg settlement leans more towards the Heeswater cluster or Hesbaye LBK than to settlements on the Graetheide or even the German Rhineland.

However, the atypical distribution of house types on the Cannerberg has no parallel in the Hesbaye region. It is of interest to look beyond the Hesbaye to see if parallels exist. Hauzeur noted mixed building traditions such as the absence of trenches at the rear of the house.\(^8\) The predominance of house types with a trench is a common feature of LBK architecture along the Neckar and in Bavaria.\(^9\) Houses without trenches are predominant in the south-west distribution area of the LBK (the Upper Rhine area and the central part of the Paris Basin). The Rhine–Meuse area which includes the Rhineland, Graetheide and Heeswater settlement clusters, are intermediate in this regard, with two thirds of the house plans without trenches (Figure 18.2).

\(^5\) When uncertainties between the classification of type 1b or type 2 both were present, both types were counted.
\(^6\) Cahen 2003, 309 figure 2-103.
\(^7\) Cahen 2003, 309 figure 2-102.
\(^8\) Hauzeur 2006; Hauzeur in press.
\(^9\) Hauzeur 2006.
suggests an influence from or links with the Paris Basin in the Youngest LBK period. It could be that the architectural traditions at the Cannerberg were influenced by traditions that existed in the south and south-western distribution area of the LBK.

18.3.3 Yards

We attempted to apply the Hofplatz model\textsuperscript{10} to the Cannerberg settlement. At first expectations were high because of the presumed low density of occupation, as suggested by the test-trenches. However, the excavation proved that the density was higher and the house yards were closer to each other than expected. It was therefore more difficult to attribute the various pits to contemporaneous houses. The results of the intra-site analysis showed a great variation in the layout of a yard. Among the 29 houses only nine have long pits on both sides of the structure. Ten structures have only one long pit along their western long side as opposed to five structures which only have such a pit next to the eastern long side. Occasionally north pits are present and most of the yards have silo pits. Eastern and western pits occur regularly on both sides of the houses. For six houses only one eastern pit was counted as opposed to two on the western side. Other pits are relatively scarce but if present are located south of the house. What is noteworthy is the number of silo pits present on the yards. At least half of the yards are believed to have silo pits, sometimes up to three per yard.

Altogether 375 pits are attributed to the settlement. Given the number of yards per ceramic phase (3-4) this would signify to a maximum of 8-10 pits per yard. If we consider that the area outside the yards was presumably used as well, or if more yards existed per phase the number of pits per yard would be less. Most pits can be classified as typical LBK pits. Locally, pits were clustered; fences and also a Schlitzgrube were excavated.

The artefacts in the pits are the main source for analysing activities in or around them. Interestingly, the artefacts present within the pits will not always be representative of or represent the activity (structured or symbolic deposition) which took place in and around the pits.\textsuperscript{11} A system where refuge was gathered in middens and later on dispersed may also have existed.

We documented a total of 24,514 finds (Table 7.7)\textsuperscript{12} from 103 pits attributed to house yards and 137 pits which may or may not have belong to a house yard. Almost two thirds of the excavated pits did not yield any finds or only some settlement debris. The number of pits varied during the life span of the settlement. From phase 14 till 17, the amount of finds is increasing but after that returns to the same level as before phase 14. This similar pattern is visible for the relative find distribution. It differs in each phase as in some pits more pottery, flint and/or stone has been discarded. From phase 14 onwards the total number of finds rises significantly but not in all younger dated pits. The youngest pits eventually produce less refuse: the number of pits with no or hardly any finds is larger than the pits with finds. Apart from this, there seems to be some preference in waste discarding strategies as some pits have far more finds than others. Fitting sherds from various pits suggests that some (parts of) vessels were discarded in one deliberate action. The other fragments are still in the unexcavated parts of the

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\textsuperscript{10} Boelicke \textit{et al.} 1988; Zimmermann 2012.

\textsuperscript{11} Boelicke \textit{et al.} 1988; Hachem 2000; Stäuble 2013.

\textsuperscript{12} For some pits the total amount of flint was not counted because of the large quantities. Also charcoal, burned clay and bone are better considered mere indications of the total amount due to fragmentation.
pits, used as temper for pottery or disintegrated in the ploughed topsoil. The question whether the refuse was primarily discarded on a heap or midden to be later on dumped into a loam pit, or was discarded directly into a pit remains unsolved. Most probably both discarding strategies coexisted.

Five more or less isolated yards were selected for spatial analysis. This showed that not all pits attributed to a yard contain a similar composition of the find assemblage. There is no apparent horizontal pattern where particular pits are chosen to deposit the refuse. Although no distinct pattern seems to emerge it is apparent that only one or two pits per yard were selected to deposit most of the refuse. It can also be stated that although the relative composition of the find assemblage differs from yard to yard there is a common waste distribution pattern where 30-40% of the assemblage consists of pottery and flint, and a smaller percentage of stone. The find distribution analysis showed that not all pits have been used as refuse pits and that some kind of waste management seems to be in order as some pits have considerably more finds than others. There is a great variation in the total amount of finds per house yard. Less than a third of the pits contained almost all the finds. Most pits are without finds or can be considered settlement debris. A relative comparison of find distribution within and between pits, contemporary or not, demonstrated that the find assemblages showed no notable patterning. Within and outside the yard area features have been excavated that are not that common within the Dutch LBK such as Schlitzgruben and pit complexes.

18.3.4 Settlement dynamics

The excavation revealed the remains of a small LBK settlement of 3 or 4 contemporaneous houses; small with respect to several of the better known settlements in the region like for example Elsloo-Koolweg with its 10-20 (if not more) houses. On the Cannerberg features were found in an area of about 350 metres in north-south direction and 185 metres in east-west direction. Bandkeramik habitation probably stretched beyond the excavation trenches: only in the southeast and in the western part of the area we can confidently state that we have reached the borders of the settlement. Also, to the east a natural border is provided by the steep slope towards the Jeker valley. The settlement measures 520 x 420 m, about half the size of the Sittard-Mgr. Claessenstraat settlement site (700 x 350 m with 60 houses). But then, the excavated part of Elsloo-Koolweg spans an area of 350-450 m and holds 114 (!) houses. The house yards at the Cannerberg are situated in a relatively elongated area within the excavation; there are three adjacent zones: a southern, a central and a northern zone. An average lifespan of the houses of 15-20 years for the Cannerberg is suggested by the pottery analysis, which compares well with findings elsewhere. Successively, houses were (re)built within each zone but their yards do not overlap with contemporary or recent house plots. The settlement expanded as new yards were occupied. Arguably, this expansion had limits. Thus, ‘older’ yards were hardly built over, and preceding domestic space was respected and avoided.

The Cannerberg Bandkeramik hamlet was composed of two to four contemporary yards at any moment (plus possibly one or two houses outside the excavation’s perimeters). The village started with two yards in ceramic phase 10 (which equates with the final phases of the LBK-Id period in the Dutch chronological system), and expanded within three generations to four contemporary yards. Successive Wohnplätze shift positions within the settlement; new yards are laid out on the edges of pre-existing
yards, and from there on continuously shifting positions around the initial yard. This is a deliberate action where the cultivated area was used to a certain extent and expansion of the settlement was not limitless. Although sufficient space was available in the immediate surroundings of the existing yards, the settlement edges hardly expanded. One possibility is that the settlement was surrounded by a fence, which has remained invisible archaeologically.

The find assemblages of the most northern Wohnplätze yielded more flint than the other yards. Generally, the relative amount of stones tended to be higher when more pottery, or less flint, was present. Domestic activities may have been (partially) divided between the households. Higher amounts of flint may relate to special activities such as wood and hide working, blade production and hunting; a higher relative amount of stone and pottery pointing towards grinding, vessel manufacturing and/or food production.

In the development of an LBK settlement, preceding the construction of the first long house(s), a pioneer phase has left hardly any traces. Thus at both Geleen-De Kluis and Elsloo-Koolweg settlement pits have been discovered that cannot directly be attributed to a house plan. They yielded the oldest decorated pottery and therefore were interpreted as evidence for the oldest phase of (pre)settlement: the pioneer phase. The oldest phase for the Cannerberg is represented by pits 744, 2054 and 2061 (ceramic phase 9). A number of pits dating to phase 9 concentrate around the centre of the settlement, in an area of ca 50 m across, more or less the size of a yard though with no trace of a possibly associated house. In the next phase, nearby, house 26 is thought to be one of the first buildings in the (northern part of the) settlement. In later phases all three zones became inhabited, i.e. the settlement expanded. In its vicinity, stretches of forest were cut and fields were cultivated. In the final phases of the settlement firstly the northern zone was given up (ceramic phase 17) but habitation continued in the south and central areas before the settlement was finally abandoned in the 20th ceramic phase (roughly, LBK-IId in the official chronology). As everywhere else in the wide vicinity, no indications have been discovered as to why the settlement was abandoned; for example, there were no traces of burning of houses which could suggest a violent ending. In the last phases of occupation there is only a slight demise in the total numbers of artefacts discarded. After the village had been abandoned it took almost 4,000 years before traces of a new occupation of the Cannerberg occur: there are no traces of post LBK activities in the Middle or Late Neolithic or Bronze age, as is the case for most Dutch LBK sites.

This ‘sudden end’ is typical for most Dutch LBK sites, as well as for the (adjacent) Belgian Hainaut and German Rhineland Bandkeramik settlement. Still, this ‘sudden end’ is after all not that sudden, as symptoms preceding it can be detected. Already from phase 2b we witness a demise in the number of settlements on the Graetheide. New settlements were founded in the Meuse valley and on the high terraces, locations that had not been settled before. We also see changes in the material culture,

13 Van de Velde 2008.
14 Modderman 1988, 98.
15 Pit 1958 was dated to ceramic phase 7, based on only one sherd. It is therefore left outside the discussion.
17 Amkreutz in press.
18 Van Wijk in press.
especially with respect to changes in flint sources and distribution networks as well as changes in flint sources and distribution networks\textsuperscript{19} as well as the procurement of different raw materials like lydite for the manufacturing of adzes. These changes occur throughout the LBK oecumene, from the Paris Basin to Moravia and Austria. In other words, the LBK world became more diverse and old traditions were left behind. These changes were not dealt with in the same way everywhere, though.\textsuperscript{20} Modderman already argued that "...different solutions were chosen for problems that were not identical everywhere". One region may have kept much more of the old Bandkeramik customs than another.\textsuperscript{21} Amkreutz argues that social and geographical factors may explain the demise of the Bandkeramik culture in the Dutch and adjacent Belgian region.\textsuperscript{22} In his opinion the increasing diversity that enabled cluster- or even village-based identity undermined interregional networks which were needed for survival. This deliberate diversity of the different settlements may have caused the downfall of the LBK culture in this region, not up to the challenge of changing the dominant culture. As Amkreutz puts it: "It could be argued that the LBK here was one of the final strongholds in north-western Europe, lasting until the very end. Burning out instead of fading into something new."\textsuperscript{23}

In this perspective we can envision the settlement of the Cannerberg which was first founded by settlers who refrained from known alliances and exchange networks and slowly became isolated. This may provide an explanation as to why rather suddenly the flint procurement strategy changed and new flint sources were tested and used. If and in which way this flint was exchanged remains outside our view. In any case did it not prevent the settlement slowly to end and be abandoned.

18.3.5 Pottery

Pieter van de Velde

The pottery analysis showed that 16 cooking, 4 storage and 12 table pots comprised the average household pottery inventory. This supposed representativity suggests a fully egalitarian community, which is perhaps in line with what most of us envisage for Neolithic horticulturalists. Such an image, however, cannot be upheld, not even for the Cannerberg LBK village, notwithstanding its quite similar, even-sized and non-hierarchical houses. Six out of the 29 houses, or one in every five, lack any pottery. This, though statistically (remotely) possible, does not comply with a scenario in which everybody had equal access to ceramics. Another clear instance of inequality in this settlement is that flint production is concentrated in (when not restricted to) the northern part of the village, i.e. associated with one single lineage among the four present. This lineage reminds of Lamys Hachem’s analysis of the Cuiry-lès-Chaudardes LBK settlement on the Aisne River. Here, she found that next to horticulturalist households, also cattle holders’ and hunters’ households, were present, each with their own and distinct inventories.\textsuperscript{24} The uneven distribution of finds at the Cannerberg, is suggestive of a comparable uneven distribution occasioned by economic differentiation. Incipient social stratification is much more likely, even demonstrable, in villages such as Geleen-Janskamperveld.\textsuperscript{25}
18.3.6 The flint working pits: surplus production and inter-community transport and exchange of flint

One of the most surprising finds of the test trenching campaign and the excavation were the so called ‘flint working’ pits. These pits yielded great quantities of flint that exceeded the traditional expectation of classical LBK pits. Three pits were excavated and have, apart from their size and find assemblage, considerable similarities concerning the composition of the flint assemblage and the way in which the flint was deposited. Two unexcavated pits show the same characteristics. The pits vary in size but all have a distinct rich fill of flint. The fill however is only 20-30 cms thick whereas the rest of the pit is devoid of any finds. Almost all pits are located on the edge of the wards or at least on the outside of a yard. This suggest that they were intentionally positioned at the edge of the domestic space where massive quantities of flint – which can be seen as the refuse but also as the products of a flint workshop – were deposited.

Figure 18.3
in a specific type of pit. Unclear is why this flint was deposited here; was it a cleanup of refuse from a flint workshop or a more ritualized event?

The great amount of flint within the five refuse pits resembles the flint blade production workshops from Verlaine-Petit Paradis located in the Belgium Hesbaye, ca 40 km to the southwest. The site of Verlaine has been excavated from 1996 until 2002 by the University of Namur. The intensive excavations revealed several houses of an LBK settlement which extends over three hectares. The site yielded 100 pits and nearly 22 flint debitage concentrations. The settlement is dated to Modderman phases 2c/2d. The site is well-known for its 12 pits packed with Hesbaye flint, either concentrations of debitage, storage pits, long pits or others kind of pits. The huge quantity of waste making up the debitage concentrations, which included several hundreds of cores per pit, points to ‘surplus’ production beyond the domestic sphere, surpassing the needs of the village community. The excellent quality of debitage and the quest for optimal production of standard-sized blades imply that productivity was clearly sought after to produce as many blades as possible. This surplus production of fine Hesbaye flint served a supra regional exchange network where settlements located in the heart of the flint-bearing region of Hesbaye, produced fine quality blades that were distributed up to 150 km from Hesbaye (Figure 18.4).

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The flint working pits within the Cannerberg settlement may have served a similar purpose and the Cannerberg community may have played a comparable (important) role in social and economic distribution networks as the Verlaine-Petit Paradis. One of the main research questions of the Cannerberg research project focused on the origin of the flint raw material. The nearby valley of the Jeker/Geer or outcrops in the Meuse valley probably served as a source for raw material. This means that flint was within arm’s reach for the settlers of the Cannerberg. The rich flint sources however do not seem to be the main reason for settling at this particular location, as within the earliest occupation phases Rullen flint was preferred and the flint working pits only appear from ceramic phase 14. This means that the Cannerberg community only took the initiative to start making a surplus of blades after being settled for some period. It immediately raises the question what the reasons were for doing this and why it did not start in the first place. First of all it shows that the presence of nearby flint outcrops was not the primary reason for settling at Cannerberg. In addition there was no demand for a surplus production of blades during the initial settlement. In this respect another characteristic merits mentioning: the Cannerberg community kept on obtaining exotic Haspengouw and other flints despite the fact that it had access to local good quality varieties, and even continued doing so after it started producing large quantities of blades. This suggests that the distribution and exchange of flint during this period did not necessarily meet a need for flint, but that it may have served a more social function in which inter-community interaction and the establishment of inter-settlement relationships were the primary goals. This participation in the regional networks may have provided the Cannerberg community with many social advances (allies, marriage partners etc.), but these regional networks may also have served a more economic goal, namely the insurance that true scarce and desired goods became distributed over considerable distances.

Regarding this latter aspect it is worth looking at areas that did not have easy access to nearby flint outcrops. Work at the German Bandkeramik sites has shown that many sites in the western and central regions yielded varying quantities of Lanaye flint with a steep decline in eastern direction. The central German sites were devoid of any nearby good quality flint outcrops and the communities there were dependent on their relationships with western neighbours for, among others, the acquisition of flint. Cannerberg may have fulfilled a role in supplying these communities with flint. For now, this is a pure hypothetical suggestion as within the work of Zimmerman on the distribution of Lanaye flint, no distinction is made between Banholt, Rullen or any other sub-varieties of this Cretaceous flint from southern Limburg. To what extent the Lanaye variety from the Cannerberg site has been used within these communities has not been studied due its very recent recognition (this work) and probably will be hard to prove in the future. This latter aspect will especially apply to cases where small samples without many cortical pieces are involved, owing to the great difficulty of distinguishing Lanaye sub-varieties when only artefacts from the inner parts are available.

29 Zimmerman 1995. In this publication the term Rijckholt flint is used for the Lanaye flint variety.
18.3.7 Domestic space, domestic waste: reproducing Bandkeramik social behaviour

The Bandkeramik settlement provided a lot of data which is addressed in many ways. Although the Linear Bandkeramik Culture is considered the earliest sedentary culture, it cannot be classified as ‘primitive’. Its social behaviour is complex although its material culture is more or less easy recognisable. But even if every household used exactly the same type of adze, pot and flint tool, there still would be differences to be witnessed within the archaeological data. This is the result of individual choices in social behaviour, within the archaeology referred to as ‘agency’. The agency theory is based on the work of Giddens\(^{30}\) and Bourdieu\(^ {31}\) who focussed “on the embedded role of individuals within society and the dialectic relationship between the structures agents both exist in and which they (re)produce”\(^ {32}\). Choices at the level of settlements and of individual households increasingly shape ways in which to express individual identities next to the existing and uniting uniform LBK identity.\(^ {33}\) The way a potter adds secondary motives to the ‘prescribed’ set of LBK decoration may be seen an example of individual expression or identity within the way LBK pottery is supposed to be decorated. Amkreutz states: “It is the emphasis on social practices, however common or ‘domestic’, in the recursive interplay between individuals and communities that shapes and consolidates social systems”.\(^ {34}\) Additionally, Braudel refers to social structures that usually span long periods and are labelled ‘quasi-constants’. These are habits of behaviour and thought, ways of grouping and organising people, in which the members of a community are brought up and which they—usually unconsciously or semi-consciously—’reproduce’ themselves and pass on to the next generation.\(^ {35}\) It is a delicate process which comprises more than imitation and upbringing. The way habits are developed also depends on the way the environment is arranged. However, existing habits may conversely lead to reproduction of the environment in the way that for example houses are rebuilt in an accustomed manner and new fields are laid out in the same way.\(^ {36}\) Social interactions or particularly domestic behaviour are therefore part of a complex process which most of the time is surpassed or disregarded within the analysis of archaeological complexes, due to its complexity.

Without going into further detail about agency, habits of behaviour and structures some general remarks can be made about domestic behaviour within the Cannerberg site. During the analysis attention was paid to the domestic unit (i.e. the yard), discarding practices and taphonomic processes. The feasibility of the Hofplatz or single homestead model\(^ {37}\) played an important role in our analysis. It provided a framework for the domestic area and its interactions. The recent study by Gomart et al.\(^ {38}\) for the site of Cuiry-Lès-Chaudardes demonstrated that different subsistence strategies existed. Foremost it revealed the dynamics within a settlement where newcomers were pinpointed in the archaeological dataset and how they gradually adapted to the settlements routine; particularly the manner in which communal activities like the consumption of aurochs and grinding were carried out. In their view, a communal role is not directly linked to a specific hierarchical position since the relationship

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31 Bourdieu 1977.
32 Amkreutz 2013, 277.
33 Amkreutz 2014.
34 Amkreutz 2013, 278.
37 Kuper et al. 1974; Boelice 1982; Claßen 2006; Zimmermann 2012.
38 Gomart et al. 2015.
between houses was merely based on surplus production per household and reciprocal exchange between households that functioned rather differently in economic terms. This difference seems to be consciously marked within the settlements lay-out. Houses in the process of economic maturation were located outside the main centre of the settlement and sometimes even occupied an isolated position.

Due to the lack of organic materials at the Cannerberg, a detailed long term study as was carried out for the site of Cuiry-Lès-Chaudardes, remains beyond our reach. The lack of faunal remains kept us from assessing which was the dominant subsistence strategy, hunting or farming, for all the excavated yards. Such particular research also needs a complete settlement to be excavated instead of part of it. Still, the research at the Cannerberg indicates that yards may distinguish themselves in flint tool manufacturing. The northern yards yielded more flint tools and substantially more debitage material. There seems to be no differentiation in stone tools between the house yards. The flint working pits may be the result of a single individual or household, or alternatively, the product of a community. The vast amount of debitage, the sheer weight of the nuggets which had to be carried to the settlement, and the seemingly short period of time for the production of blades, point toward a (perhaps seasonal) communal activity at the edge of the yard or Wohnplatz. It looks like this was done to create surplus and was not just for daily need as the flint assemblages within the house yards show that flint knapping also took place on the yard, but in far smaller quantities.

Outside activities are witnessed within the settlement due to the methodology used. It was one of Moddernans main focus points for future research. Outside activities are hard to trace when excavations mainly focus on house structures and the densely inhabited areas of the settlement as the greatest concentration of material remains of human activity is found in and around the houses. Outside activities are only present because the inhabitants had to go beyond the settlement to collect a wide range of material to bring home from various distances. The result can be found within and in the immediate surroundings of the hamlet. Examples range from burial grounds, food (especially cereal, cattle and wild life) consumption and flint procurement to wood gathering (charcoal). But outside activities can also occur outside the yard and within the ward. The flint working pits which were used for communal activities from such a representation of the life beyond the house yard. Indications for outside activities can be observed when, for example, regarding the raw material use for flint. Although locally forehanded flint was used, relatively large quantities of Rullen and Hesbaye fine grey were brought into the settlement. The same goes for the amphibolites adzes which, as micro wear studies showed, were sharpened and polished on site. These are ample examples of activities that went beyond the daily domestic sphere and as such were probably treated in such a way. Social interactions therefore occurred on different social levels within and between settlements, each interaction affecting others, continuously.

39 Gomart et al. 2015, 245.
40 Ibid.
41 Modderman 1988, 89.
42 See for instance Bakels 1978.
43 Modderman 1988, 89.
44 Bakels 2009.
45 De Grooth 2014.
46 Salavert & Dufraisse 2014.
18.3.8 Exceptional Cannerberg

The Bandkeramik settlement of the Cannerberg proved to be an exceptional settlement when compared with other known settlements in the Euregion. The location is atypical for most LBK settlements which, in this region, are mostly situated on the middle terraces. It is only in the younger phase of the LBK that a change is witnessed where settlements are also located on the high terraces as well as on the lower terraces. The settlement itself is relatively small and consists of two to four houses per habitation phase. The settlement was first colonised in Modderman phase 1d/2a and continued until phase 2d. In total 29 house yards have been reconstructed, each consisting of a house with multiple pits along side the building or on other locations within the yards boundary. Comparisons regarding the size of a yard have been made. For the Cannerberg settlement we estimated the size of the yard at about 1500 m² (roughly 35 x 40 m). This is smaller than most German yards which are estimated twice as large (3000 m², 50 x 60 m). The smaller size of a yard is related to the smaller size of the house structures at the Cannerberg and due to the dominance of type 2 and type 3 buildings. The near absence of type 1 (a/b) houses or Großbauten is a striking difference compared to other known settlements. It is as if in respect to architectural traditions, influences seem to have come more from the south and south-western distribution area of the LBK. This is contrary to the pottery styles which resemble most with the Graetheide settlements. Some influences from other regions are present within the pottery assemblage; however, only in small amounts. Therefore, it seems not too far fetched to assume that the inhabitants of the Cannerberg came from the Graetheide region. The Cannerberg’s initial colonisation was probably socially induced by farmers that looked for alternative locations outside the Graetheide region.

An attempt was made to get a grip on the settlements structure. Primarily, we focussed on the structure of the house yard, more specifically the distribution of pits and finds. It appeared that not all houses had long pits. Pits are evenly distributed over the yard and we assume that 8-10 pits were present on a yard during each phase of the settlement. The find distribution analysis showed that most pits remained empty. Only a few pits contained finds, which led us to believe that a specific waste distribution system was in place. However, there is no difference in the composition of waste. At least half of the yards had silo pits. Almost all of these pits were located within the yard area, sometimes up to three per yard. Some pits have traces of burning which indicates that they have been reused. Most noteworthy are the flint working pits which are located on the edges of a yard. In total five of these pits have been found, of which three have been excavated. They contain large quantities of flint and suggest that a similar procurement strategy as in the Hesbaye existed where flint was distributed over the southern distribution area of the LBK world. Uncertain is whether the flint from the Cannerberg was distributed in such large quantities and over such a large area as well. As it is a Lanaye type of flint, it is very difficult to distinguish between different types of Lanaye flint. It is evident that the flint from these working pits was not used primarily for home use. The flint assemblages from the various yards show a pattern which is in line with other settlements in the area although larger quantities of Hesbaye and Rullen flint have been found.

47 Van Wijk in press.
48 Banholt flint is also a Lanaye type flint but has particular features which makes it more easy to distinguish from other Lanaye flint. Something which is clearly not the case for the Cannerberg flint.
Based on the pottery chronology and the ‘thought exercise’ as stated above, a ward or Wohnplatz (which consists out of multiple contemporary yards) at the Cannerberg is composed out of six yards, possibly only four. These yards are distributed over a northern, central and southern part of the settlement. In the central area one or two yards existed simultaneously. It is unknown how many (contemporary) yards existed north of the excavated area. Throughout time, the various yards shifted position and were rebuilt with respect to previous yards, only slightly overlapping them. Still, the settlement’s outlines and the habited area hardly expanded. This may be caused by the position of cultivated fields along the western border of the settlement. It may also be an indication that a settlement boundary like a fence existed although no traces of such a boundary are preserved. The steep drop to the Jeker valley floor created a natural border to the east. The settlement’s outline evidently shows that when a new yard was constructed a certain set of rules had to be followed with an emphasis on the location of the fields and abandoned yards.

We believe that the alternative location on a high terrace and close to rich flint sources paved the way for different procurement strategies, especially in regard to the procurement of flint. However, the closeness of flint resources seemed not to be the ‘pulling factor’ for the settlements initial founding. At first known flint outcrops were extracted and flint from these sources was exchanged. Later on the emphasis was laid on sources nearby and surplus production occurred.

The excavated remains of the settlement for now did not give any direct indications as to why the settlement eventually ceased to exist. The diversity in the use of the material culture (flint) and the alternative use of type 2 and 3 buildings, feed the idea that this diversity was socially induced. The change in social hierarchy probably played an important part in the demise of the settlement on the Cannerberg.

Finally, we wish to address the problem of labelling the Heeswater and Graetheide clusters to topographically different settlements. The chronology of the settlements just north and northwest of Maastricht showed that this region was inhabited more or less contemporary with the Graetheide region. Until now, no convincing arguments have been found within the material culture to separate both settlement clusters as different cultural groups. The settlement of the Cannerberg probably holds a unique position in this discussion because of its different character. A presumed answer lies in the unexcavated settlements in the Hesbaye region. In order to assume that different groups existed in the Graetheide and Heeswater region we need more comparable data from sites south and west of the Maastricht area.

18.4 Iron Age

Lucas Meurkens

The Iron Age settlement features excavated on the Cannerberg can be roughly divided into two periods. The bulk of the features dates to the period between 800 and 400 BC, during which the area appears to have been inhabited continuously by (probably) one farmstead and associated outbuildings.

Our data suggest that the settlement on the Cannerberg ended around 400 BC.

49 Van Wijk et al. 2014.
The only indication for habitation after this date is a wide ditch with a V-shaped cross-section (residual depth 1.0-1.3 m) which has been dated to the Middle or Late Iron Age. The ditch can possibly be interpreted as part of a Late Iron Age fortified settlement, a so-called oppidum.

Our results contributed significantly to the knowledge of Early Iron Age habitation on the loess soils, in particular with regard to characteristics of house plans and the type of settlement system prevalent on the loess soils at this time.

The discussion regarding house plans centres on the presence of large houses on the South Limburg and adjoining German and Belgian loess soils. Large Early Iron Age houses are known in some numbers from the sandy soils of Brabant, but on the loess soils they were curiously lacking. None of the Early Iron Age settlements in the region (for instance Geleen-Janskamperveld, Geleen-Hof van Limburg, and Beek-Maastricht Aachen Airport) have yielded examples, even though in some cases large areas were stripped of topsoil during excavation. Only smaller two- and three-aisled buildings were encountered on these sites. When found on the sandy soils these types of buildings would probably be typified as outbuildings. Van Hoof has made a typology of these smaller buildings and interprets at least a part of the smaller plans as house. Based on the investigation on the Cannerberg and the recently published Belgian findspot of Bilzen-Spelverstraat it may be argued that this view is no longer up-to-date. Larger house plans are present (at least on the Dutch and Belgian loess soils) and are typologically comparable to the house plans of the Early Iron Age found on the sandy soils of Brabant, in particular the type of St. Oedenrode / Oss-Ussen. These plans are characterized by a regularly placed pairs of wall posts. The central roof-bearing construction of these structures is alternately two-, three- or four-aisled which on paper sometimes makes the centre of the plans look rather untidy. This is especially the case when post pits are lacking or were not recognised as such. The latter was probably the case with both the house plans of the Cannerberg and the plans of Bilzen. The wall posts on the other hand were distributed very evenly (at least in houses 1 and 2). Furthermore, the occurrence of large storage pits inside the plans, as on the Cannerberg, is typical of the plans of this type.

Why have these larger plans only been documented so rarely on the loess soils? The answer is probably twofold. On the one hand, they may be difficult to recognise. The central roof-bearing construction in the Cannerberg plans was rather untidy. The wall-posts of the plans were spaced regularly in rows, but when posts are missing in these rows as is the case for some of the Cannerberg plans, it does become a lot harder to recognise them as such. Only one of the Cannerberg house plans was recognised as such in the field (house 1). Based on that specimen a search was made for comparable plans during post-excavation analysis. Ultimately (parts) of minimally three additional plans could be reconstructed. Another noticeable characteristic of the Cannerberg plans is that the central construction was often less well preserved than the walls.

On the other hand, the rarity of these plans may be due to the general criteria used in selecting areas for excavation after trial trenching at a given site. In general, zones with the greatest feature density are selected, while the excavation on the Cannerberg

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50 Van Hoof 2007.
51 Van Hoof et al. 2013.
52 Tichelman 2010.
54 See Hiddink 2014 for a discussion on the late prehistory house typology.
has shown that most of the Iron Age house plans are actually located in areas with a low feature density. The trial trenches in this area of the Cannerberg only yielded a handful of possible Iron Age postholes. House 1 was actually only recognized because it was decided to investigate the entire terrain by means of wider (20 m) trenches. The Cannerberg also contained a zone with larger density of Iron Age features in the north-east. This area was also excavated and did yield many features, but the value of the information appeared to be much more limited. The features mainly consisted of pits. Postholes were also presented, but could only be reconstructed into smaller outbuildings and one possible house plan. A cautionary lesson to be learned from this is that on Iron Age settlements the richest areas are not necessarily the most informative.

With regard to the settlement system the excavations at the Cannerberg also raise questions. Often a settlement system of wandering farmsteads (Dutch: ‘zwervende erven’) is assumed for later prehistory. This settlement system has been described by Schinkel for the site of Oss-Ussen located on the sandy soils of North-Brabant.\(^{55}\) In this settlement system the settlements (in fact isolated farmsteads) move once in a while to let the fields regenerate. The question has been raised earlier whether this settlement system was also adopted for the loess soils of South-Limburg. The Cannerberg shows continuous occupation on more or less the same spot from the beginning of the Early Iron Age to the first half of the Middle Iron Age. The house plans therefore probably represent successive farmyards, which occupied more or less the same location. This implies there was no necessity to move the settlements because of exhausted fields.

18.5 Roman Period

Lucas Meurkens

The Roman settlement features excavated at the Cannerberg comprise a partial house plan of Alphen-Ekeren type with an associated granary and several pits and ditches. Due to the partial nature of the investigation of this settlement its nature is not exactly clear. The absence of stone architecture has led us to conclude that we are dealing with a small rural settlement consisting of one or more wooden built houses. The settlement was possibly enclosed by a ditch system. Several comparable settlements are known from the countryside surrounding Maastricht, among others Veldwezelt (B)\(^{56}\), Maastricht-Lanakerveld\(^{57}\), Maastricht-Landgoederenzone\(^{58}\) and Heerlen-Trilandis.\(^{59}\) Most of these settlements yielded several Alphen-Ekeren type houseplans associated with watering troughs and, in some cases ditches surrounding the settlement. Some of these rural settlements developed into villas with stone-built architecture (e.g. Maastricht-Landgoederenzone). It may be questioned whether rural settlements without indications for stone-built architecture such as the Cannerberg should be interpreted as a different type of rural settlement (as opposed to villa-sites). Another possibility is that they represent an (earlier) phase of the same type of settlement, in which the main building for whatever reason was not (re)built in stone. The Roman remains at the Cannerberg are too scanty however, to delve into this problem deeply.

\(^{55}\) Schinkel 1994.
\(^{56}\) Pauwels 2007.
\(^{57}\) Meurkens & Van Wijk 2009.
\(^{58}\) Hazen & Blom 2015.
\(^{59}\) Tichelman 2014.
18.6 Modern times (16th-20th century)

Ivo van Wijk

From the Roman Period onwards there are hardly any traces of human actions to be found on the Cannerberg. It probably remained a forested area until in the 16th century a large number of ditches were dug. These ditches combined to border a rectangular area. We interpret these as defensive positions relating to one of the sieges of Maastricht. The town was under siege multiple times from the 13th century onwards. The Cannerberg was of strategic value and therefore of importance. However, no known battles have been fought at this location. This is acknowledged by the absence of battle related artefacts. The LIDAR analysis revealed evidence in the form of clear example of circumvallation lines. Just along the eastern ridge of the Cannerberg the remains of ‘Fort de Jeker’ have been found which most probably belong to the fortifications dug during the Eighty Years’ War or Dutch War of Independence (1568–1648) in Maastricht. Also the double ditch system located at the southern edge of the research area had a defensive function.

The strategic position played a major role in the biography of the Cannerberg. During WWII defensive positions were taken upon the flanks and artillery was positioned here. At a certain moment British 4 lbs incendiary cluster bombs were dropped. Eventually Allied troops took up camp and left some of the refuse behind.

Finally a large secret NATO base was built in the marl under the Cannerberg. Its air vents are still visible today but the base is nowadays out of order.

18.7 Comparing the stone assemblage

Annemieke Verbaas

During the excavations at Maastricht Cannerberg 4015 stone artefacts dating from the LBK to the present day were found. The analysis of the stone assemblage had to be limited as many more artefacts were found than expected. It was therefore decided to focus the analysis on a small part of the LBK assemblage. For the other artefacts only the total amount of tools and the total amount of heated artefacts were counted. All LBK adzes, ground pieces of ochre and stones with a smooth surface were selected for use wear analysis.

A total of 1285 stone artefacts could be attributed to the LBK. Half of these could be related to one of the yards found. Most raw materials were locally available and were probably collected from the banks of the river Meuse or from outcrops of Meuse deposits close to the site. Some non local raw materials were found as well. The ochre and most of the raw materials for the adzes probably originate from the Ardennes (this is sure for the oolitic ochre), the Eiffel and maybe even from the Tsjech republic were LBK amphibolite quarries were found.

Of the LBK assemblage 24% can be described as tools, which is average for a LBK site. The amount of querns is quite high with 21%. All of the tool types are present in the yards, indicating that all activities involving stone tools in the LBK Cannerberg site were executed on a household basis. This also includes woodworking with adzes. Some yards have a higher percentage of querns, indicating they may have been a place of assembly.
The stone artefacts found in features attributed to the yards are similar to those that cannot be attributed to the houses, indicating that the waste of similar activities filled these pits. The use wear analysis focussed on the use of ochre and stones with a smooth surface. For the ochre four types could be distinguished. The most common variety, the oolitic ochre, was probably imported from the Ardennes, more specifically the region of Namur. The origin of the clastic ochre is still unclear. Even though the ochre had to be transported over a large distance there are some pieces without traces of grinding or other modifications and of pieces that have only been slightly ground. The method used for grinding is, due to a lack of experimental reference collection at the time, unclear. However, two different modes of grinding can be observed. One entails grinding on a grinding stone or possibly scraping the pieces of ochre with a flint or for example bone tool. The other method of grinding does not leave striations and exactly how this was done remains unclear for now.

The stones with a smooth surface are used for different activities. They are used to crush, sand and grind plant materials, wood, organic materials and medium hard stone. A special find comprises the traces of grinding medium hard stone material. This tool was probably used for the maintenance of the adzes. These traces have not been observed before in Dutch LBK assemblages.

The largest part of the stone tool assemblage could be attributed to the Iron Age with a total of 2231 stone artefacts. These however mainly comprise heated unworked pieces of stone (73%). The percentage of tools is very low (1.1%). The materials from the houses vary a lot. There is a large difference between the houses and pits in terms of tool composition and percentages of heated stones, indicating a diversity in activities between the different houses. Special finds are imports of vesicular basalt from Mayen in Germany and an LBK adze. The adze can of course have been reused but there are no indications for this. It may therefore be interpreted as a kick up.

Only 80 stone artefacts can be attributed to the Roman Era. Some fragments of vesicular basalt indicate the presence of querns probably imported from Mayen. Some pieces of marl were used as foundation for a house.

There is a large difference between the use of stone artefacts in the LBK and the Iron Age. Where the LBK shows a high percentage of querns and other tools and a relatively low number of heated stones, the Iron Age assemblage consists of mainly heated stones and the percentage of tools is very low. In the LBK the tool use is very similar between the houses and the houses and pits, whereas in the Iron Age a large difference is visible, indicating a different use of stone tools and a different social organization.

18.8 Synthesis of the archaeobotanical results

Corrie Bakels

Before the actual excavation started it was assumed that traces of occupation by farmers of the Early Neolithic Linearbandkeramik, Bronze Age, Iron Age and Roman Period would be found. The original plan therefore was to follow the output of these farmers from the earliest activities up to and including the Roman Period. Unfortunately the features found did not meet this ideal. However, it is possible to make a comparison between the Linearbandkeramik and the Early and Middle Iron Age, which implies a comparison between the periods 5100-4800 BC and 800-400 BC.
Because of the limited amount of information, only a comparison on species level is possible. Four points can be discussed:

- It is a common fact that the number of crop plants grown rises during prehistory, also on the loess soils of Western Europe.\textsuperscript{60}
- It is also known that the number of weed species rises.\textsuperscript{61}
- Linearbandkeramik farmers cut their crops relatively high on the stalk whilst Iron Age farmers cut lower.\textsuperscript{62}
- What may also be investigated is whether the long history of tilling the earth on the Cannerberg had any influence on the properties of the soil as regards nutrients and acidity.

The answers are as follows:

- In the case of Maastricht-Cannerberg the Linearbandkeramik displays two crop species whilst the Iron Age displays five. The expected rise is indeed found.
- The list of Linearbandkeramik weeds comprises 10 species (\textit{Bromus} sp. and \textit{Vicia hirsuta/tetrasperma} are not counted as they may represent species already listed). The Iron Age revealed 14 species with a large overlap with the Linearbandkeramik list. On the basis of the Maastricht-Cannerberg samples it cannot be concluded that the number of species has risen. As other Iron Age sites on the loess of the southeastern Netherlands do display an important rise\textsuperscript{63}, this result may be due to the low number of samples.
- As far as may be assessed on the basis of the low number of samples and species, the difference in harvesting practice is indeed visible.
- Most weeds on both lists indicate a good condition of the soil where nutrients are concerned, but sheep’s sorrel (\textit{Rumex acetosella} L.), in the Iron Age record, is an indicator of soils with a lowered pH. However, a plant like annual mercury (\textit{Mercurialis annua} L.), also on the Iron Age list, avoids such soils. It is therefore very difficult to conclude that the local soils had deteriorated.

To conclude: even a set of only eight Linearbandkeramik samples and ten Iron Age samples, both poor in remains, do present results. Nevertheless, a higher number of samples would have been preferable.

18.9 Dynamics on the Cannerberg

The Cannerberg has a long history of human occupation ranging from scarce visits by hunter-gatherers to a settlement of the first farmers during the Early Neolithic, a settlement in the Early Iron Age, a possible oppidum in the Late Iron Age, a settlement during the Roman Period and war-related defensive positions from the 16\textsuperscript{th} century until the Second World War. It therefore seems that the Cannerberg was a preferred location. Still, settlements from the Middle Neolithic to the Late Bronze Age are absent. Settlements dating to this period seem to have preferred other locations, probably in the Meuse valley, where they were more sustainable.

Our research focussed on the Early Neolithic and Iron Age habitation. Although both are substantially different, some comparisons may be made. Both subsistence economies have a strong relationship, especially when regarding the settlement

\textsuperscript{60} Bakels 2009, 254.
\textsuperscript{61} Knörzer 1979; Bakels 2009, 114.
\textsuperscript{62} Bakels 2009, 114.
\textsuperscript{63} For instance Bakels 2013.
patterning and use of raw materials. They are predominant agrarian communities which dealt with and made use of the environment in their own and sometimes similar way. The best examples are a Bandkeramik adze found within an Iron Age silo pit and various Iron Age features cutting over Bandkeramik pits. Iron Age farmers may have been aware of their LBK predecessors on the Cannerberg. A reconstruction of the Cannerberg as presented in Figure 18.5 could therefore apply to both cultures. The landscape would be slightly altered with more forest cleared, the houses aligned differently, but overall the fields with various crops provided the most valuable assets. Its crops carefully provided for and stored in pits in the ground, making sure that the village had ample provisions for the next year.

18.10 A day in the life

Luc Amkreutz & Ivo van Wijk

The excavations at the Cannerberg, their exciting results and the public outreach inspired us to create two reconstructions of the settlement: one providing a bird's eye view of the settlement within its environment and a second one focusing on the individual house yards.

18.10.1 Illustrating the Cannerberg

The illustration of Cannerberg was based on results coming directly from the field campaign. These were used by artist Mikko Kriek for the production of both impressions. The use of computer software and techniques, in this case 3d Max and Vue, in the creation of these digital impressions has the big advantage that the images are not static. Within certain limits there is room to adjust previous versions. This is crucial, since in most cases the artist is not archaeologically schooled (in this case he was), nor will he or she have been present at the excavation. The process of translating is as such often hindered by archaeologists speaking a different language than the artists. The remaining product then is usually a compromise between time, budget and communication. With digital drawings, however, time is bought to a certain extent. This enables the commissioning party to have details changed. In this case, the ongoing analysis of the excavation, the consultation of recent literature on comparable LBK settlements and the information provided by (archaeobotanical) specialists could be incorporated and altered the images considerably before the final version was produced. Arguably, with these images there maybe is no final version, as it is always possible to add or alter detail. Finally, there is another big advantage to these digital drawings and that is that they are in fact not a fixed image, but a 3D recreation. This enables the artist to not only introduce or remove elements, but to change perspective, “camera-position” and lighting altogether. This makes a drawing not just an image, but perhaps also a tool to explore a past world or environment and to visualize what may be abstract points of discussion. In the following section both plates will be presented and briefly described.

64 The presented text here is also, more elaborately published as Amkreutz & Van Wijk 2015.
18.10.2 Overview 1: The Cannerberg settlement complete

The image shows the Cannerberg settlement from an elevated bird’s eye perspective. It is mid-summer at the end of a hot day and clouds are gathering above the site for yet another thunderstorm. Visible to the right are a number of east-west oriented houses, widely spaced, characterised by smoke coming from their roofs. In between the houses there are small garden plots bordered by hedges and fencing that were used for crops such as lentils and peas. Several tracks indicate the most frequently used routes. The area is partly cleared and covered with shrubs and weeds. Individual trees remain, providing shade. The house furthest on the right is under construction, several trunks and planks are visible. Cattle are herded to the fallow fields in the foreground and a big fire is burning in an open area to the left of the houses. The nearer settlement area is separated from a second part of the village by a narrower corridor which is visible to the back. In the centre of that ward a house yard has been abandoned and is recognisable by its charred post stumps and the gradual reclamation of the area by weeds. To the west of the settlement and separated by a narrow band of trees, several fields are visible; they are bordered by trees and shrubs. The fields are yellow from the ripe emmer and einkorn, while some lie fallow. In the open spaces cattle can graze. The tree stumps of the vast Atlantic forest are still visible. The forest itself, largely consisting of lime and oak trees, covers most of the landscape like a blanket. Towards the river valley it diversifies and develops into more swampy open patches near the water. Also visible are several clearings in the forest.\textsuperscript{65} They may have developed

\textsuperscript{65} Kreuz 2008.
naturally or by human intervention, but according to the latest views characterise the Atlantic forest. Some of the clearings in the distance are definitely of anthropogenic nature. They represent actual nearby settlements, as can be seen by the smoke on the horizon.

To the east the valley of the Joker/Geer is visible. It was a small stream, but offered a diversification of the landscape. In the distance it merges with the Meuse at the current location of Maastricht. It was a source location for (lithic) raw material in the Cannerberg settlement. Clearly visible beneath the tree cover are the limestone “cliffs” of the Pietersberg. The slopes to the east and west of the Cannerberg have become steeper, as the Cannerberg only later gained its undulating appearance due to erosion caused by large-scale Roman and medieval deforestation.

18.10.3 Overview 2: The Cannerberg settlement in detail

This image provides a somewhat adjusted close-up of the northern part of the Cannerberg settlement. It depicts four Type 2 houses. Two of these are functioning, one is being built, and another one has burnt down: some of the roof-bearing poles have been removed and the remnants of the house are slowly taken over by the undergrowth. The functioning houses have painted façades⁶⁶ and are bordered by wall trenches or pits that are filled with muddy water, due to an intense thunderstorm that passed earlier that day. Clearly visible are also the other pits, some of which have gradually filled up again, scattered across the open space. A number of well-trodden paths cross the small shrubbed area; tree stubs, occasional trees and weeds remain. In the direct vicinity of the houses there are small garden plots, while in between the two houses there is an open space with fire and some logs. Clearly visible is the impressive forest edge and the tall trunks of lime and oak. In front of these, shrubs delineate the

zone between forest and clearing. To the left one of the fields is visible with ripened emmer or einkorn, as well as a corner with some flax shimmering bluish in the distance. In the foreground a number of people are visible. One is knapping flint on the edge of a large pit. This corresponds with the enormous amount of knapping debris, blades and cores found in three of the Cannerberg pits.

18.10.4 Hoogcanne: a day in the Life

If we can come to terms with the fact that the impression offered is exactly that: not a reconstruction of an LBK settlement, but rather an image of it based on archaeological information and informed extrapolation, then its creation becomes positive in two ways/areas. With respect to the public, it provides a welcome image of something that is difficult to visualize by archaeological finds and excavation plan drawings alone. Also it becomes something people identify with and that creates a sense of familiarity and realism, hence the title. In the case of the Cannerberg excavation, Maastricht citizens, who are rather familiar with their Roman heritage, now also included their early farming roots as something to be proud of, as part of their identity. The LBK settlement on top of the Cannerberg was soon dubbed “Hoogcanne” as a counterpart of the 17th century castle and associated village of Neercanne at the foot of the hill. Furthermore, posters and postcards of the impression were ordered by the Projectbureau A2 Maastricht for use in public relations. The excavation in fact took place within the scope of nature compensation for the development of the A2 motorway tunnel through Maastricht.

67 Salavert et al. 2012.
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Appendix 1 Research questions (in dutch)

**Bodemopbouw**

1. Wat is de regionale (gebied van ca. 5 x 5 km), landschappelijke context van het onderzoeksgebied?

2. Door welke sedimentatie- en erosieprocessen is het landschap ontstaan, en wat is de ouderdom van de verschillende stadia? Welke landschappelijke veranderingen zijn in het onderzoeksgebied opgetreden vanaf het Mesolithicum?

3. Hoe is de archeologisch relevante geologische en bodemkundige opbouw van de ondergrond en het reliëf in het onderzoeksgebied? Zijn er aanwijzingen dat de huidige brikgronden ontstaan zijn door degradatie van zgn. “schwarzerden”?

4. Wat is de fysiek-landschappelijke ligging van de vindplaatsen en wat is de relatie tussen afzettingen, bodemtypen, reliëf en de aanwezigheid van vindplaatsen? Wat zegt dit over de locatiekeuze en het vroegere landgebruik?

5. Hoe was (volgens de beschikbare literatuur) de ontwikkeling van het biotisch landschap van het onderzoeksgebied vanaf het Laat-Glaciaal?

6. Is er in de directe omgeving een locatie aan te wijzen waar water aanwezig is geweest? Op welke afstanden bevinden de vindplaatsen zich hiervan?

7. Wat is de cultuurlandschappelijke ontwikkeling van het onderzoeksgebied en wat is de cultuurlandschappelijke ligging van de vindplaatsen?

8. Zijn er aanwijzingen voor landgebruik in de diverse periodes in de zin van wegen, percelering, akkers, grondstofwinning, etc.?

**Gaatheid en conservering**

9. Wat is de mate van conservering en gaafheid van de specifieke sites en/of off-site verschijnselen?

10. Wat is de aard en kwaliteit van de bodem qua conservering van archeologische resten en in welke lagen of gebieden zijn deze resten of aanwijzingen voor landgebruik te verwachten?

11. Bestaan er verschillen in de conservering van archeologische resten binnen het onderzoeksgebied als gevolg van erosie, afdekking en bodemvorming?

12. Zijn er in de directe omgeving van de vindplaats betere conserveringsomstandigheden te verwachten?


15. Is er een relatie tussen het (micro)reliëf en de conservering van de archeologische resten?
Perioden en sites
16. Wat is per archeologische locatie in het onderzoeksgebied: de ligging (inclusief diepteligging), omvang (inclusief verticale dimensies), aantal sites en/of perioden, type en functie van de sites of off-site-patronen, samenstelling van de archeologische resten (grondsporen, materiële en organische vondsten), vondsttichtheid, stratigrafie, ouderdom, periode, type-chronologische classificatie?
17. Wat is in het onderzoeksgebied de ruimtelijke verspreiding, zowel in horizontale als in verticale zin, van vindplaatsen, sites en off-site-patronen?
18. Is het mogelijk om op vindplaatsen met resten uit verscheidene perioden of fasen, ruimtelijke patronen te onderscheiden?
19. In hoeverre is er sprake van verschuivingen in de nederzettingenpatronen en landgebruik in de loop van de tijd?
20. Bestaat er tussen de verschillende neolithische nederzettingsterreinen, inclusief de reeds bekende vindplaatsen op de locaties Lanakerveld/Caberg, chronologische en/of functionele verschillen dan wel overeenkomsten en waarin komen die tot uiting?
21. Heeft bij de eventuele neolithische vuursteenvindplaatsen de bewerking ter plekke plaatsgevonden of is er slechts sprake van eindproducten?

Bandkeramiek
22. Hoe is de bandkeramische nederzetting gestructureerd, hoe zijn de erven opgebouwd, hoe ontwikkelde de nederzetting zich in tijd en ruimte, hoe ziet de periferie van de nederzetting er uit, is er een verschil tussen de nederzettingssstructuur in de Graetheidecluster en Heeswatercluster in bepalende factoren voor de locatiekeuze (bijv. nabijheid water in bronnen/poelen)?
23. Is de nederzetting op de Cannerberg gelijktijdig gesticht met die op de Caberg?
24. Is de nederzetting op de Cannerberg continu dan wel met onderbrekingen bewoond?
25. Was de nederzetting op de Cannerberg nog bewoond toen de bandkeramische nederzettingen op de Caberg en de Graetheide al gegeven waren?
26. Welke vuursteensoorten werden gebruikt (en welke niet) en waar werden ze vandaan gehaald? Zijn er aanwijzingen te vinden voor locale specialisatie?
27. Een scan van de vuursteenassemblage uit het proefsleuvenonderzoek laat zien dat het vuursteen niet, zoals op de Graetheide en ook op de Caberg gebruikelijk was, uit een eluviale context of uit het terras komt, maar uit hellingafzettingen of uit verse kalksteen. Wat is de bron van dit vuursteen geweest? Was het mogelijk om vuursteen te mijnen/rapen in het aangrenzende Jekerdal?
28. Heeft op de Cannerberg specialisatie binnen de nederzetting plaatsgevonden of past het materiaal toch in ad hoc vuursteenbewerking op huishoudelijk niveau zoals wordt verondersteld voor het vuursteen van de Graetheidecluster (De Grooth 1994)?
29. Was natuursteen uitsluitend in het Maasdal verzameld of zijn ook andere bronnen aan te wijzen?
30. Wat zijn de gebruikstoppassingen van het steenmateriaal?
31. Dankzij uitgebreidere monsterprogramma’s in de meest recente opgravingen begint langzaam een beeld te ontstaan, waarin gewassen zoals gierst gebruikt zijn als een soort noodgraan bij een mislukte oogst. In de late periode van de bandkeramiek lijkt ook het dieet langzaam te veranderen en doen nieuwe gewassen hun intrede. Kan het onderzoek op de Cannerberg dit beeld bevestigen of aanvullen
32. Is op basis van het vondstmateriaal uit de LBK-vindplaats(en) vast te stellen tot welke Cluster (van Wijk en Meurkens 2008; Klasberg 2012) de vindplaatsen gerekend mogen worden? Zijn er aanwijzingen voor de aanwezigheid van andere vroegneolithische groepen zoals Limburg, La Hoguette en Bliquy? Zo ja, is er inzicht in de relatie tussen deze groepen, met name chronologisch?

Late Prehistorie

33. De opbouw van een erf is nog steeds niet bekend voor Zuid-Limburg en ook voor de rest van Zuid Nederland. Daarnaast heerst nog steeds onduidelijkheid over welke typen huizen werden gebouwd. Is er sprake van een regionale variant?

34. Zijn er daarnaast activiteitenzones (silo’s) aan te wijzen die wel of niet onderdeel zijn van een erf?

35. Welke keuzes zijn gemaakt met betrekking tot de voedselvoorziening en wijkt deze af van de voorgaande en opvolgende bewoningsperioden?

Romeinse tijd

36. Wat is het karakter van de vindplaats? Hoe zien de randen van de bebouwde kern er uit en wat is de globale lay out? Zijn er off site-structuren aanwezig (diverticulum/graven)?

37. Is er een bewoningscontinuïteit vanuit de late ijzertijd of tot in de vroege Middeleeuwen?

38. Welke keuzes zijn gemaakt met betrekking tot de voedselvoorziening en wijken deze af van de voorgaande agrarische samenlevingen?

Synthese

39. Hoe kan samenvattend na dit onderzoek de bewoningsgeschiedenis van het onderzoeksgebied beschreven worden?

40. Wat zijn de landschappelijke kenmerken van de locatie en zijn directe omgeving voor, tijdens en na de onderzochte perioden en welke conclusies kunnen getrokken worden over de invloed van de mens op de vorming van het landschap?

41. Waarom zou men deze locatie uitgekozen hebben voor de ter plekke aangetroffen functie(s)?

42. Welke verbanden zijn er te leggen met historische, historisch-landschappelijke, bouwhistorische en overige cultuurhistorische aspecten van het onderzoeksgebied en zijn omgeving?

43. Hoe vergelijkbaar is de onderzochte locatie met andere locaties in de archeoregio met dit complextype en deze datering en hoe passen de bevindingen van het onderzoek in de archeo-regionale context? Denk hierbij aan de kwaliteitsaspecten representativiteit en ensemblewaarde.
Conclusie, evaluatie, aanbevelingen

44. Is er een verwachting dat buiten het nu onderzochte gebied nog resten van deze vindplaats aanwezig zijn en wat is de verwachting omtrent de fysieke en inhoudelijke kwaliteit daarvan?

45. Hoe verhouden de conclusies zich tot de resultaten van het eerdere onderzoek of andere bekende gegevens? In welke mate wijkt de geconstateerde waarde af van de eerder toegekende waarde (indien van toepassing) of van de gespecificeerde verwachting (indien van toepassing)?

46. In welke mate heeft dit onderzoek bij kunnen dragen aan de bovengenoemde onderzoeksthema’s uit NOaA en andere onderzoeksagenda’s? Hoe is het kennisrendement te omschrijven?

47. Welke strategische en methodische aanbevelingen kunnen worden gegeven voor vervolgonderzoek?
Appendix 2 Boringen Jekerdal 4 en 13 juni 2013

Locatie van de twee boorvelden met schematisch de boorpunten ingetekend.
Boorraai langs Jezuitenpad in dalbodem Jekerdal en langs de helling in westelijke richting (westelijk van de Cannerweg)

Boring 1: in beekdal vlak naast de Cannerweg (dieptes in cm onder maaiveld)
0-50 cm: ophooglaag met veel puin en mergelbrokken
50-90 cm: verspoelde löss/alluvium met weinig gleyverschijnselen
90-195: verspoelde löss/alluvium met veel gleyverschijnselen
195-262: verspoelde löss/alluvium, gereduceerd en iets humeus; verkoelde plantenresten, grote macrorest (lijkt op een boon o.i.d.), wortelresten; onderin horizontaal gelaagd
262-337: horizontaal gelaagde afwisseling van laagjes meer en minder humeuze klei en laagjes met kalkgruis/kalkgyttja (nog uitzoeken wat voor materiaal dit is; materiaal voorzichting uitspoelen en nakijken onder microscoop – is van belang voor reconstructie afzettingsmilieu). Zichtbaar zijn schelpresten/resten van (zoetwater)slakjes
327-415: sterk humeuze klei (kleig veen), gaat naar boven toe geleidelijk over in het veenpakket
415-427: homogene beekafzettingen, sterk siltige klei
427-450: homogene beekafzettingen, zwak zandige leem
470-490: horizontaal gelaagde afwisseling van kleig veen en sterk humeuze klei
490-560: homogeen pakket zandige leem, compact
560-620: homogeen pakket zandige leem/sterk siltige klei, zeer compact en opvallend geelbruinig/beige gekleurd

Boring 3: 25 m verder in raai
0-180: verspoelde löss/alluvium met gleyverschijnselen
180-200: humeuze klei

Boring 9: 25 m verder in raai
0-160: verspoelde löss/alluvium met gleyverschijnselen
160-260: homogeen pakket humeuze klei
260-345: kalkgyttja met humeuze kleilaagjes
345-380: veen, iets kleig
380-410: iets humeuze klei
410-455: siltige klei, weinig humeus. Boring eindigt op grind

Boring 2: 75 meter verder dan boring 1 in Jekerdal
0-150: verspoelde löss/alluvium met gleyverschijnselen; stukje steenkool op 50 cm; schelpresten
150-220: verspoelde löss/alluvium, naar onder toe steeds humeuzer met steeds meer schelpresten
220-330: homogeen pakket humeuze klei
320-365: kalkgruis/kalkgyttja met humeuze kleilaagjes
365-385: veen, iets kleig
385-400: humeuze klei
400-480: homogene klei, enkel humeus bandje; schelpresten
480-500: zandige leem; opvallend geelbruine kleur; boring eindigt vermoedelijk op grind
Boring 10: laatste in de raai, 25 voorbij boring 2

0-220: verspoelde löss/alluvium met gleyverschijnselen

220-280: homogeen pakket humeuze klei, pakket wordt naar onder toe steeds humezer

280-365: kalkgyttja met humeuze kleilaagjes

365-378: kleiig veen

378-382: sterk humeze siltige klei

382-480: homogeen pakket iets humeuze siltige klei

480-490: kleiig veen

490-510: homogene siltige klei

510-540: zeer compact uiterst fijn siltig zand

**Boring 1** met het bovenste deel van de veenlaag met daarop de laagjes met kalkgruis/kalkgyttja.
Boring 4, ter hoogte van de Cannerweg

0-30: Bouwvoor, colluvium met mergelbrokken, grind
30-50: Colluvium met stukken baksteen en steenkool
50-250: Colluvium met humusfibers, fijne horizontale gelaagdheid, fijne kalkfragmentjes, kiezels, onbewerkt vuursteen
250-280: Colluvium, iets donkerder (humeuzer?) dan bovenliggend pakket; baksteen-spijkers; naar onder toe steeds meer kalkgruis
280-390: kalkgruis/kalgyttja, wel met iets klei ertussen? (monsters voorzichtig uitspoelen en onder microscoop kijken of het hier om schelprestjes en/of microfossieltjes gaat)
390-460: kalkgruis met iets meer klei, roestkleurig
460-470: Sterk humeuzer klei/kleig, zeer compact en zeer weinig macroresten herkenbaar
470-570: humeuzer klei, naar onder toe steeds minder humeuzer
570-590: iets zandige leem, zeer compact, opvallend geelbruine/beige kleur

Boring 8, 25 meter voorbij boring 4

0-30: Bouwvoor, colluvium met mergelbrokken, grind
50-230: pakket jong colluvium, horizontaal gelaagd met zandige laagjes
230-270: fijnere colluvium, iets humeuzer, enige bodemvorming: ouder colluvium
270-400: pakket kalkgruis met iets klei/silt; onderin meer silt en kalkbrokjes
400-410: sterk humeuzer klei
410-430: kalgyttja met humeuzer laagjes
430-480: iets humeuzer klei
480-530: zandige leem, zeer compact
530-600: zandige leem, horizontaal gelaagd, zeer compact, enkele sterk zandige laagjes

Boring 7, 25 meter voorbij boring 8

0-50: Bouwvoor, colluvium met mergelbrokken, grind
50-200: pakket jong colluvium, horizontaal gelaagd met zandige laagjes
200-220: fijnere colluvium, iets humeuzer, enige bodemvorming: ouder colluvium
220-260: kalkgruis
260-300: sterk siltige klei met gleyverschijnselen, horizontaal gelaagd
300-350: siltige klei met gleyverschijnselen, zeer compact
350-400: sterk siltige klei, horizontaal gelaagd met onderin kalkbrokken en onderin grind

Boring 5, 25 m voorbij boring 9

0-50: Bouwvoor, colluvium
50-190: Colluvium, t/m 170 cm kalkhoudend, daarna kalkloos; op 140 baksteen
190-280: Colluvium, iets steviger en kleijer dan bovenliggend pakket, zeer fijne horizontale gelaagdheid, vanaf 250 weer iets meer silt. Op 280 boring gestuit op steen
Boring 6, 25 m voorbij boring 5

0-30: bouwvoor

30-130: jong colluvium met veel grind

130-170: pakket ouder colluvium met enige kleinspoeling

170-250: pakket ouder colluvium, horizontaal gelaagd, op 250 cm gestuit op grind

Boring 7, met halverwege de laag met kalkgruis en daaronder de beekafzettingen
Appendix 5 Jekerdal true upland som
Appendix 6

Catalogue Bandkeramik structures

House 1

General remarks
The structure of House 1 lies in the most northern part of the excavation. A part of the construction is preserved and a number of postholes are attributed to the house structure as well as some pits (Figure 1). Mainly the post holes of the central part of the structure have been identified. The structure is for a lesser part disturbed by recent features as well as a large Bandkeramik pit complex and a large Iron Age pit. Some pits of this complex possible belong to this house.

Construction
The inner construction consists of at least two rows of three post holes (DPR). They are also the largest posts from the structure. The outer wall is formed by a few remaining wall posts. Based on the still remaining postholes we assume that the length of the structure is about 13.4 m and the width 4 m; the total area is 53.7 m². The orientation of the structure is NWW-SEE.

Type
The type of the structure is determined according to Modderman’s typology for the LBK houses. The position of some post holes suggest the position of a corridor in the western part of the structure, diving the structure in two parts. The structure is possible a Modderman type 2 building. A subdivision isn’t possible since there are hardly any remain of the NW-part.

1 After the German word Drei Pfosten Reihe.
2 Modderman 1970.
Pits
Directly along the building are a number of pits been excavated. Not all pits have been sectioned so in some cases the function remains unclear. Pit 2093/43-12 which lies on the eastern side of the structure, is a longpit with a remaining depth of about 55 cm. The filling has two charcoal rich layers on the bottom. The pit is filled with various finds. On the same side of the building there are another pit present (2092). It has more or less the same filling but seems to lack the distinct charcoal layers. The feature has a smaller length in the section (ca. 1.2 m) than was seen on the plane.

On the other side of the house are three more pits situated. Pit 226/2151 has the same filling as pit 2093/43-12. On the same side lies pit 2131. Only a small part of the pit remains and the question rises if this feature has to be labelled a post hole instead of a pit.

Find material
Most of the finds are from the pits 226/2151 and 43-12/2093 (see table). They contain a mixture of pottery, flint and stone artefacts. Special objects include a small amphibolite adze.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Pit 226/2151</th>
<th>Pit 43-12/2093</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Weight (g)</td>
</tr>
<tr>
<td>Pottery</td>
<td>50</td>
<td>209.5</td>
</tr>
<tr>
<td>Flint</td>
<td>82</td>
<td>661.3</td>
</tr>
<tr>
<td>Stones</td>
<td>4</td>
<td>33.8</td>
</tr>
</tbody>
</table>

Table 1
Finds from pits 226/2151 and 43-12/2093.

Chronology
Based on the pottery seriation the house dates to pottery phase 13.


**House 2**

**General remarks**
The structure of House 2 is also located in the northern part of the excavation. Thirteen postholes of the construction are preserved and four pits are attributed to the house structure (Figure 2). Mainly the roofcarrying post holes of the structure have been identified as well as some wall posts of the eastern wall. Just north of the structure are some pits and postholes present which might indicate that another structure has exist (house 29). This also might offer an explanation why there are some pits lying within the structure of house 2.

**Construction**
The inner construction consists of at least three rows of three post holes (DPR). The outer wall is formed by five remaining wall posts from one side of the structure. From the other side no wall posts have been found. Based on the still remaining postholes we assume that the length of the structure is at least 8.9 m and the width 4.7 m; the total area is ca. 51 m². The outer shape is slightly trapezium like. The orientation of the structure is W-E.

**Type**
There are only a few postholes of the structure remaining. Therefore it is difficult to determine the type of the structure. It could be that there is a corridor present in the western part of the house which would make it a type 2 house. But a type 3 house where there is only a central part of the house remaining seems more suitable also in regard to the minimal length of the house.

**Pits**

![Figure 2: House 2 with pits](image-url)
There are a few pits present in the direct vicinity of the structure. Not all pits have been sectioned so in some cases the function and relation to the house remains unclear. There seem to be no longpits present flanking the north side of the structure. But at the south side there are two longpits present (2194 and 2195). Both pits are relatively shallow and are 60 and 24 cm deep. On the western side of the structure are three pits (2219, 2199 and 2113) situated. Pit 2213 and 2199 are so called Kesselgruben. Pit 2213 has a depth of 334 cm. It’s filling indicate a gradual filling process. The pit probably has been primarily used as a silo. Some small charcoal layers are also visible at the bottom of the pit (Figure 3). Pit 2119 has a depth of 88 cm and a similar shape as pit 2213. It’s filling however is more layered which indicate at a more staged filling of the pit. As is explained below it remains unclear whether this pit actually belonged to this yard.

Find material
Most of the finds are from the pits 2194 and 2195 and 2113 (see Table 2). They contain a mixture of pottery, flint and stone artefacts.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Pit 2194</th>
<th>Pit 2195</th>
<th>Pit 2113</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Weight (g)</td>
<td>Amount</td>
</tr>
<tr>
<td>Pottery</td>
<td>3</td>
<td>15.9</td>
<td>7</td>
</tr>
<tr>
<td>Flint</td>
<td>25</td>
<td>78.3</td>
<td>30</td>
</tr>
<tr>
<td>Stones</td>
<td>3</td>
<td>711.2</td>
<td>4</td>
</tr>
</tbody>
</table>

Chronology
The phasing of the house proofs to be quite a puzzle. Only two pits in the vicinity contained enough decorated pottery for a seriation. The pottery from pit 2119 is dated to phase 11 and pit 2180 dated to phase 9. It is obvious that pit 2180 doesn’t belong to the structure since it is positioned within the structure. This means that this pit is either dug before or after house 2 was built. If pit 2119 really belonged to this house it would mean that pit 2180 was dug beforehand and thus dating the house to phase 11. Another possibility is that both pit 2119 and 2180 belong to the same yard. They were almost dug at the same time if we look at the phasing. It remains questionable that a silo pit which has been burned a few times was located so close to the building. The silo pit 2113 is located a few meters further which seems to be more practical. So in hindsight we have no direct clues to date house 2. If we assume that houses weren’t build over old pits we can very carefully assume that the house is older than phase 9.
possibly dating to phase 11.

House 3

General remarks
In the north-eastern part of the excavation was house 3 located. Only a few postholes remain on which a structure is being reconstructed (Figure 2). The postholes from the inner section as well as the sidewall have been preserved. In the south-eastern part the structure is disturbed by a Iron age silo pit.

Construction
Some posed of the central axes of the roof carrying post have been preserved as well as some post from the wall. This way it is possible to more or less determine the construction of the building. The length of the structure is at least 8.8 m and the width 5.6 m; the total area is ca. 51 m. The outer shape looks rectangular. The orientation of the structure is NNW-SSE.

Type
There are only a few postholes of the structure remaining. Therefore it is difficult to determine the type of the structure. It is possible that the structure reaches more to the north west. Unfortunately there was a tree present which limited the extend of the excavation.

Pits
One long pit (500) is located next to the southern wall of the building. It has a depth of 70 cm. Some more pits lie in the vicinity but can't be directly linked to the house although they might belong to the yard.

Find material

Figure 4
House 3 with pits
All the finds are from pit 500. It contains pottery, flint and stone (Table 3).

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neolithic pottery</td>
<td>196</td>
<td>1781.8</td>
</tr>
<tr>
<td>Flint</td>
<td>173</td>
<td>3465.9</td>
</tr>
<tr>
<td>Stones</td>
<td>29</td>
<td>1858.5</td>
</tr>
<tr>
<td>Ochre</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Burned clay</td>
<td>1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

*Table 3*
Finds from pit 500.

**Chronology**

Based on the pottery from pit 500 the house is dated to phase 16.
House 4

General remarks
In the central northern part of the excavation is house 4 located. It consists of a cluster of postholes. The question was whether this cluster could be divided into two different structures. This is merely based on the position and orientation of some long pits and other pits in the vicinity. Eventually it is decided that the cluster represents only one structure (Figure 5). Some postholes from the inner structure as well as the sidewalls have been preserved.

Construction
The position of the DPR’s is somewhat skewed and in a slight angle from the main orientation of the building which is NW-SE. The length of the structure is at least 13.4 m and the width 4.3 m; the total area is ca. 59.1 m². The outer shape looks slightly trapezoid.

Type
There is no clear indication that a corridor was present. The structure could either be a type 2 or type 3 building.

Pits
A number of pits surround the building. At least two pits (1964 and 1976) can be classified as long pits. The other pits (1975, 1940, 1939, 1963, 1965, 702, 709, 710, 1979 and 700/1980) are all oval or round pits. Although a number of pits have been found surrounding the structure it is not possible that they all belong to the yard. This is based on the pottery seriation which varies from phase 12 to 16. We therefore have to look at the position and orientation of the pits. As a result we think that the pits

Figure 5
House 4 with pits
700/1980, 702, 710, 1964, and 1976 belong to the house yard. The other pits probably belong to another yard or space of a different younger phase in the settlement.

Pit 700/1980 is most remarkable. It has a diameter of ca 5.9 m and a depth of over 100 cm. It is cuts over pit 1979. The pit originally consisted of three or more small (silo) pits which after its primary use was covered by a large darker filling which contained many finds. The most of the bottom filling of the original pits 700/1980 indicate a gradual filling with almost no finds. However, on the bottom and centrally positioned in the pit a large stone was deposited. Most finds were clustered in the top layer (2123 artefacts). This large quantity is somewhat skewed in perspective to other pits because a part of the filling has been sieved which resulted in many (very) small fragments which normally wouldn't have been recovered during excavation of the pit. The pit's inventory suggests a final use as waste pit which was in use during ceramic phase 13. Although the pit is positioned next to several house structures such as house 4, is it believed that none of these are directly related to the pit as they all seem to date younger. A few pits (702 and 710) in the vicinity however have been used around the same phase as pit 700/1980 and are related to house 4. It is therefore possible that pit 700/1980 could belong to this house yard as well or represents a different area of use.

Find material
Apart from pit 702 and 1979 all pits contain a lot of finds like pottery, flint, bone, charcoal, burned loam and stone (Table 4). A part of the filling of pit 1964 and 1965 have been wet sieved (3 mm). The abundance of finds in these pits seem to be exceptional for this site.

Chronology
As mentioned before it proved quite a challenge to assign the various pits to the structure. In the end the chronology, position and orientation of the pits determined their relationship with the structure. Most of the attributed pits date to ceramic phase 12–13.
House 5

General remarks
As mentioned above (house 4), there was some discussion whether all the features would belong to house 4. It can also be argued that the cluster of features belong to two different houses (house 4 and 5). If this would be the case than house 5 consists of a few postholes (704, 703, 706, 720, 721, 1871, 722, 1872, 1977 and 1978). With dimensions of 4.5 by 3.8 m it only represents a small type 3 building. Pit 711/1979 and 1971 are than related to the structure.

Pits
Pit 711/1979 probably is a silo pit that has been cut over by pit 700/1980. It is ca 100 cm wide and 70 cm deep. Its infill suggests a gradual filling of the pit. Pit 711/1979 has been sectioned but it remains unclear whether this feature is of anthropogenetic or natural origin.

Find material
Both pits yielded in total two pottery sherds and two pieces of flint.

Chronology
Based on the small amount of finds no ceramic phase could be attributed. The only indication could be pit 1980 which cuts over pit 1979 suggesting that it is older than pit 1980 which is dated to ceramic phase 13. House yard 5 should therefore be older than house yard 4.
House 6

General remarks
Just southeast of house 4 is house 6 positioned. Almost no wall posts have been preserved but strangely enough a part of a wall ditch in the north-east corner of the building remained. No direct long pits were present in the near vicinity (Figure 6). Most pits cluster around the north-western part of the yard and along the south side of the house.

Construction
The building consists of three post rows as well as a wall ditch. The roof carrying posts seem to be relatively good preserved and vary in depth from 14 to 43 cm. The poor visibility of the features is due to some recent car tracks which run straight across the structure. The length of the structure is at least 11.9 m and the width 4.2 m; the total area is ca. 48.1 m². The outer shape is rectangular. The orientation of the structure is NWW-SEE.

Type
The three remaining DPR’s are not enough to make a solid remark of what kind of building type house 6 is. A corridor which marks the transition between a NW- and central part is missing. The wall ditch suggests that there might have been a surrounding wall ditch which would make house 6 a type 1a building. But if this was true there would have been more preserved of this ditch, especially in the northwestern part where the ditch usually is founded deeper. It thus remains unclear if we should consider this structure a type 1a or another type of building.

Pits

![Figure 6](image-url)
As mentioned, there are some pits surrounding the structure. There seem to be no long pits positioned directly along the building. Pits 1958 and 1945/2491 are long pits but it isn't sure if they belong to the yard. They are somewhat further from the house than could be expected and especially pit 1945/2491 seems to have a different orientation. Presumably pits 1947 and 1956 belong to the yard but more pits like 1957 and 1933 could have been part of it as well. Both pits didn't contain any finds.

Chronology

Based on the pottery analysis of pits 1933, 1945 and 1958 which have a presumed relationship with house yard 6, a ceramic date of phase 12 is given.
**House 7**

General remarks
House 7 is located in the centre of the excavation. The preservation was surprisingly good and a lot of posts have been found. The house is almost completely excavated apart from a, presumed, small eastern part. The building is flanked by a few pits (Figure 7). The preservation however is gradually getting worse towards the eastern part of the building.

Construction
Due to the relative good preservation most post holes have been visible making it possible to make some valid remarks about the construction. The building is divided in at least two different parts: a NW-part and central part. The good preservation is also reflected in the depth of the central postholes. The vary up to 60 cm depth. The wall posts reach down to a maximum of 15 cm. The length of the structure is at least 14.4 m and the width 4.8 m in the W-part and 5.85 m in the E-part; making the structure trapezoidal. The total area is ca. 78.6 m², one of the largest buildings in the settlement. The orientation of the structure is NWW-SEE.

Type
As a corridor has been attributed which automatically means the building is at least as type 2 house. Due to a worse preservation in the eastern part of the house as well as the incomplete excavation of the structure it remains unclear if we are dealing with a type 1c or 2 building.

Pits
Pit 598 is situated directly south along the long side of the building. It is a long pit.

*Figure 7*  
House 7 with pits.
which contained some finds. It’s filling suggest a gradual filling process. The pit is just 50 cm deep. More to the east lies pit 599. This pit hasn’t been sectioned but presumably belongs to the yard as well. Along the northern long side of the house there haven’t been any pit been found.

Find material
Just a few finds were extracted from pit 598 containing pottery, flint and stone tools (Table 5).

Table 5
Finds from pit 598.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>19</td>
<td>86.1</td>
</tr>
<tr>
<td>Flint</td>
<td>7</td>
<td>123.3</td>
</tr>
<tr>
<td>Stones</td>
<td>5</td>
<td>145.5</td>
</tr>
</tbody>
</table>

Chronology
Just a few decorated sherds from pit 598 were excavated, they suggest a ceramic date of 18.
General remarks
The most western structure in the central part of the excavation is house 8. The eastern part of the building is being disturbed by recent car tracks which also disturbed parts of house 6. The building is flanked by five pits (Figure 8).

Construction
Based on the remaining post holes it is possible to determine the length and width of the structure. The postholes have a varying depth of 12-30 cm. The length of the structure is at least 10.2 m. The width 4.3 m. The structure is rectangular and it’s orientation NWW-SEE. The total area is ca. 43.5 m².

Type
It is not possible to determine the type of the building.

Pits
The building is flanked by five pits (755, 754, 753/2054, 774 and 775/2053). They all seem to be long pits with many finds in them. The depths reach down to 100 cm for pit 753 and 40 cm for pit 774. The pits 753/2054 and 775/2053 both have distinct layers which suggest a rapid filling of the pit. The other pits all showed a gradual filling process.

Find material
As mentioned most of the pits contained finds. They vary from pottery, flint, adzes,
stone, charcoal, bone and burned loam.

Chronology

Pits 753/2054 and 775/2053 contained enough pottery for a ceramic date. Pit 753/2054 dates to ceramic phase 9 and pit 775/2053 dates to phase 13. Together they date house 8 to ceramic phase 11-13 as we prefer the dating results from pit 775/2053. Pit 753/2054 delivered only two decorated sherds which leaves enough room for discussion about the certainty of the dating.

Table 6
Finds from pit 754, 753/2054, 774 and 775/2053.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Pit 754</th>
<th>Pit 753/2054</th>
<th>Pit 774</th>
<th>Pit 775/2053</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amount</td>
<td>Weight (g)</td>
<td>Amount</td>
<td>Weight (g)</td>
</tr>
<tr>
<td>Pottery</td>
<td>168</td>
<td>3406.9</td>
<td>25</td>
<td>369.40</td>
</tr>
<tr>
<td>Flint</td>
<td>83</td>
<td>3469.8</td>
<td>30</td>
<td>719.60</td>
</tr>
<tr>
<td>Stones</td>
<td>13</td>
<td>1043.7</td>
<td>6</td>
<td>939.40</td>
</tr>
<tr>
<td>Burned clay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
House 9

General remarks
House 9 is located in the central part of the excavation. A large part of the structure has been preserved making it possible to distinguish the type and shape of the construction. Unfortunately there are still a lot of features missing as is for the other houses in this excavation. Part of the northern long side is obscured by an Iron Age ditch. The building is flanked by four pits (Figure 9).

Construction
Most of the central part of the structure is preserved just as some parts of the long sides of the house. Three DPR rows can clearly be seen as well as two other posts to the east and west of the central part. There is some discussion as to the length of the structure. Feature 2066 and 2072, both postholes, could belong to the structure but seem to be not in line with the other posts. In addition it can be observed that the pits all lie along the eastern part of the building. One would suspect that these pits would be more evenly distributed along the building which would be the case if we accept that the mentioned postholes don't belong to the structure which makes the structure a lot smaller. It does seem to be more appropriate to go with a more smaller version of the building. The depth of the DPR postholes vary between 38 and 43 cm, those of the side walls vary between 11 and 18 cm.

The length of the structure is at least 10.2 m, probably extending somewhat more to the east. The width varies between 4.9 and 5.6 m giving it a trapezoidal shape. The orientation is NWW-SEE. The total area is ca. 54.3 m².

Type
The most western DPR is in fact part of the NW-part of the house. The other two DPR's make the corridor and therefore divide the building in two parts; a type 2 building.

Figure 9
House 9 with pits.
The building is flanked by four pits (654, 656, 674 and 675). The pits are all relatively shallow with depths of 20 to 34 cm. Pits 654 and 656 seem alike, both shallow and with some finds. Probably dug to produce loam for the walls. Same goes for the other two pits, all pit fillings indicates a gradual filling process. A small number of finds have been recovered from all four pits.

Find material
Three of the pits contained finds, pit 654 remained empty. Finds include pottery, flint, stone, charcoal and burned loam.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Pit 656</th>
<th>Weight (g)</th>
<th>Pit 674</th>
<th>Weight (g)</th>
<th>Pit 676</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>12</td>
<td>92.1</td>
<td>11</td>
<td>81.3</td>
<td>9</td>
<td>135.3</td>
</tr>
<tr>
<td>Flint</td>
<td>27</td>
<td>116.2</td>
<td>1</td>
<td>10.9</td>
<td>15</td>
<td>68.1</td>
</tr>
<tr>
<td>Stones</td>
<td>1</td>
<td>24.8</td>
<td></td>
<td></td>
<td>4</td>
<td>17.3</td>
</tr>
<tr>
<td>Burned clay</td>
<td></td>
<td></td>
<td>2</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronology
Just a few decorated sherds from the pits were excavated. Clearly not enough for a ceramic date.
**House 10**

**General remarks**
Next to house 9 is house 10 located (Figure 10). It is just partially excavated and most of the eastern part of the structure is still beneath the topsoil. Only one pit seems to be related to this structure although more can be expected in the unexcavated area.

**Construction**
Although parts of the construction are obscured by more recent features it is clearly visible that three DPR’s remain. It seems obvious that only the NW-part of the building remain. The eastern DPR’s forms a corridor. The depth of the DPR features reaches to a maximum of 33 cm. Post from the side walls indicate a rectangular shape of the building. The wall posts only reach up to 10 cm below the plane.

**Type**
It is assumed that a corridor is present. This would divide the structure in at least two parts. It could be that the building was divided in three parts but if this would the case than we would have seen some features of the SE-part in the excavated area to the east. Since they are not present it is more likely that we are dealing with another type 2 building.

**Pits**
Pit 802 seems to be related with house 10. It reaches down to 40 cm and contained no finds.

**Chronology**
Since there haven’t been any pottery finds it was impossible to date this house.

*Figure 10*
House 10 with pits.
House 11

General remarks
In the eastern part of the excavation we find house 11. Probably not all of the structure is excavated but a great number of features have been traced. The building is flanked by some pits. Most of them are partly outside the excavation pit.

Construction
When looking at the field drawings it can be seen that a few rows of postholes distributed over the structure remain. To the west it looks like a corridor is preserved. In the central area two DPR's are present. From the SE-part only four roof supporting posts remained. Although hardly visible in the plane one of the them was visible in the section through pit 140. An important notion if we come to date the structure. The length of the structure is at least 14.5 m, probably extending somewhat more to the west. The width varies between 4.3 and 4.9 m giving it a slightly trapezoidal shape. The orientation is NWW-SEE. The total area is quite large; ca. 75 m².

Type
At least one corridor seems to be present and therefore at least a type 2 building. It is possible that this building was a type 1 building to the length of the house. Unfortunately it can be ascertained by any certainty as not enough posts remain to attribute a clear central and SE-part.

Pits
The building is flanked by four pits (152, 166, 167 and 160). None of the pits unfortunately have been sectioned.

Figure 11
House 11 with pits.
Find material
Some finds have been retrieved when digging the plane. They include some pottery fragments as well as some pieces of flint and stone.

Chronology
Although hardly any finds can be related to this house there are some remarks to be made about the dating of this house. This is merely done on basis of one postholes of the structure that has been placed through pit 140. This (silo) pit contained a lot of finds on which basis it has been dated to ceramic phase 17/18. This would implicate that house 11 is younger than this pit. We think that the pit has been fully closed before the structure has been build partly over the pit. The house therefore dates probably to ceramic phase 19 or 20.
House 12

General remarks

Just next to house 11 is house 12 situated (Figure 12). It is the largest house of the (known) settlement. Parts of the house were already excavated during the test trenching phase. It was then discovered that at the first excavation plane a few postholes were visible. When lowering the plane more postholes became visible; especially the inner posts. It was the starting point for a still ongoing discussion: lower the plane with approximately 10 cm and lose most of your wall posts or leave it at the same level where all pit features are clearly visible but miss your inner posts. As the research aims where more focused on the structure of the yards than on the houses itself the excavation plane was left on the level where wall posts were visible.

Construction

Striking of this structure is that most of the wall posts haven been preserved. Therefore the shape and dimensions of the building can be derived. The length is 15.7 m and the width varies somewhat between 5.6 and 6.1 m. Still the shape remain more or less rectangular. Although by lower the plane some additional inner posts were retrieved the inner structure is not very obvious. Part of a corridor seems to have been preserved. This divides the building in two almost equal parts. The features are very shallow. Of the inner posts the maximum depth reaches not further than 25 cm. The wall posts reach only to 15 cm below the plane. The orientation is NWW-SEE. The total area is large; ca. 92 m².

Type

The house consists of two different parts and therefore can be described as a type 2 building.
Pits
Two large longpits (pits 27 and 45) flank the central part of the house. On a deeper plane it was clear that they could be separated in a small number of pits with a common backfilling. Five more pits surround the house on all sides. It is not as certain that these pits also belong to the yard. Pit 140 lies on the western short end of the house. Only pits 27, 45 and 140 have been sectioned.

Pit 140 has a layered filling and at least three different charcoal layers are visible. The small layers on the bottom of the pit suggest that the pit might have been used for water storage. A function as a silo seems to be out of the question as the sides are standing outwards instead of straight upwards. At a later stage it seems there has been another pit dug into the original pit suggesting another phase of use.

A question remains if pit 140, also mentioned in relation to house 11, belongs to house 12. We cannot exclude the pit from the building but as will be argued below, the dating of pit 140 seems to be more or less the same as the dating, based on decorated ware, from pit 27.

Find material
Most finds have been done when excavating pit 27 and 140. Pit 27 as well as 140 have a lot of pottery, flint and stones but also have charcoal, bone and burned loam and an adze. It seems to be the typical Bandkeramik waste assemblage. The other pits haven’t been sectioned but didn’t seem to hold a lot of finds when looking at their clear filling with no distinct charcoal or burned loam layers.

Figure 13
Pit 140 in section.
Table 8  
Finds from pits 27, 45 and 140.

<table>
<thead>
<tr>
<th>Find Category</th>
<th>Pit 27 Amount</th>
<th>Weight (g)</th>
<th>Pit 45 Amount</th>
<th>Weight (g)</th>
<th>Pit 140 Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>124</td>
<td>1076.6</td>
<td>25</td>
<td>211.3</td>
<td>145</td>
<td>1942.3</td>
</tr>
<tr>
<td>Flint</td>
<td>123</td>
<td>1700</td>
<td>27</td>
<td>635.6</td>
<td>64</td>
<td>745.7</td>
</tr>
<tr>
<td>Stones</td>
<td>145</td>
<td>6347.7</td>
<td>20</td>
<td>5290.4</td>
<td>30</td>
<td>1055.2</td>
</tr>
<tr>
<td>Burned clay</td>
<td>28</td>
<td>580.5</td>
<td>64</td>
<td>1471.1</td>
<td>26</td>
<td>158.7</td>
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<tr>
<td>Charcoal</td>
<td>9</td>
<td>15</td>
<td>1</td>
<td>10.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronology

Based on the decorated ware from pit 27 the house dates to ceramic phase 16, pit 45 dates it to phase 17. Pit 140 dates to ceramic phase 18. Therefore the house is dated to ceramic phase 17.
House 13

General remarks
House 13 seems to be the best preserved building of the excavation. Most of the postholes are present (Figure 15). It only seems that some inner posts of the NW-part are missing. The building is flanked by two pits only.

Construction
Most of the wall post have been preserved which means that we have a clear understanding about the size of the structure. The length measures 13.9 m. It’s width measures 5.5 m, the area is ca. 74.3 m². The shape is rectangular maybe slightly trapezoidal. Although most of the posts are visible they remain up to a maximum of 40 cm deep under the plane. Most postholes only reach down to a maximum of 20 cm.

The orientation is NWW-SEE. The eastern part of the structure is formed by three rows of evenly distributed DPR’s. The western part is much more unclear.

Type
There is no distinct corridor present. Still there seems to be a larger gap between the eastern the DPR’s and the western most DPR. It is thought that this DPR reflects the transition between two different areas in the construction. It therefore is labelled as a type 2 building.

Figure 14
Overview of house 13.
There seem to be no long pits present flanking the building. Instead there is one pit (pit S807) lying northeast of the building. This oval pit with straight sides has a layered charcoal rich filling. It contains also a lot of finds. A cluster of pits lies just south of the building. Most of these pits are very shallow and hardly contain any finds. Pit S815 is thought of to be related to the house. Unfortunately it hasn't been sectioned.
Find material

Pit 807 holds a lot of finds including pottery, flint, stone, bone, charcoal, burned loam, some grinding stones and an adze (Table 9).

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Pit 807 Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pottery</td>
<td>112</td>
<td>1521.4</td>
</tr>
<tr>
<td>Flint</td>
<td>88</td>
<td>1497</td>
</tr>
<tr>
<td>Stones</td>
<td>23</td>
<td>5524.7</td>
</tr>
<tr>
<td>Ochre</td>
<td>1</td>
<td>15.6</td>
</tr>
<tr>
<td>Burned clay</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Bones</td>
<td>2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Table 9

Finds from pit 807.

Chronology

Based on the decorated ware from pit 807 the house dates to ceramic phase 20.
House 14

General remarks
Another cluster of houses can be found in the southern part of the excavation. House 14 is part of this cluster (Figure 17). Most of the eastern wall posts as well as some inner posts have been preserved. A number of pits lie in the close vicinity of the building.

Construction
The eastern part of the building is best preserved. Based on the wall post the house has a length of 12.5 m. It’s width is 4.9 m. In total covering an area of about 62.2 m². The layout of the construction remains partly unclear. Two DPR’s are visible as well as some other inner post suggesting the position of other DPR’s. No corridor is present. It is remarkable that the wall posts are only preserved in the eastern part of the house. This could be due to the bad preservation conditions but it could also be if the western walls were build out of planks. The maximum depth of the sectioned postholes reach no deeper than 22 cm.

Type
There is no distinct corridor present but the assumption that there might have been a plank wall in the western part suggests that this building would be a type 2b building.

Pits
A number of pits surround the building. Pits 983 and 966 seem to be long pits. Pit 983 has a bowl like shape with two distinct fillings. The top layer contained all the finds. It even consisted of a cluster of pottery fragments indicating a rapid filling of the pit. The two different layers suggest that the pit was first dug for loam quarrying and after it gradually filled up again it became a waste pit. Pit 966 was during the Iron age overbuild with a 4 post structure. The pit turned out to be very shallow with a depth of 23 cm against 100 cm for pit 983. Pit 957 also belong to the but wasn’t sectioned.

Figure 17
House 14 with pits.
Find material

Pit 983 holds a lot of finds including pottery, flint, stone, charcoal and burned loam (Table 10).

<table>
<thead>
<tr>
<th>Find category</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>188</td>
<td>4028.7</td>
</tr>
<tr>
<td>Flint</td>
<td>132</td>
<td>2016.1</td>
</tr>
<tr>
<td>Stones</td>
<td>26</td>
<td>572.9</td>
</tr>
<tr>
<td>Ochre</td>
<td>2</td>
<td>16.9</td>
</tr>
<tr>
<td>Burned clay</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

**Chronology**

Based on the decorated ware from pit 983 the house is dated to ceramic phase 18.
House 15

General remarks
House 15 is lying just besides house 14 (Figure 19). Some wall posts as well as some inner posts are preserved. A number of pits lie in the close vicinity of the building.

Construction
The construction remains mostly unclear as only two DPR’s are preserved. They are part of the corridor which separates the two parts of the building. Sectioning of a few of the posts indicates of a depth no deeper than 22 cm. The length of the building measures 11.9 m. The width varies between 4.1 and 4.4 m; a slight trapezoidal shape. The orientation is NWW-SEE. In the south-eastern part an Iron age pit masks any other Bandkeramik features.

Type
The corridor forms the division between the central and western area. Therefore it is labelled as a type 2 building.

Pits
Some pits are situated close to the building, more specifically like a pit complex. Features belonging to this are pits 1410, 1411 and 966. The latter, 966 probably belongs to house 14. Pit 1410 seems like an long pit belonging to house 15. As pit 1411 cuts through pit 1410 it seems that this pit is of a later phase than house 15. Pit 1414 is another pit along the northern wall of the structure. It seems to be a long pit however the pit is very shallow in contradiction as would be suspected of a long pit. The northern pits are distributed somewhat further away. Pit 1797 and 1798 are probably natural disturbances. On the other side three more pits are present: pit 23.9, 1388 and 1389. They haven’t been cross-sectioned and as a result no finds have been retrieved.

Figure 19
House 15 with pits.
Find material
Most finds belong to pit 1411. It contained a lot of pottery, flint, burned loam and stone including an adze and a fragment of ochre but probably belongs to another yard; house yard 16. Only pit 1414 yielded some finds (Table 11).

<table>
<thead>
<tr>
<th>Find category</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>11</td>
<td>73.8</td>
</tr>
<tr>
<td>Flint</td>
<td>2</td>
<td>135.8</td>
</tr>
</tbody>
</table>

Table 11
Finds from pit 1411 en 1414.

Chronology
Based on the decorated ware from pit 1411, which dates to ceramic phase 15, the house is dated younger than ceramic phase 15.
House 16

General remarks
Parallel to house 15 lies house 16 (Figure 20). Here more wall posts seem to be preserved as well as some inner posts. A number of pits are associated with the building.

Construction
The wall posts give a good indication of the size and shape of the building. The length of the building measures 12.56 m. The width varies between 4.5 and 5.2 m; a trapezoidal shape. The orientation is NWW-SEE. The various inner posts must have been part of different DPR's but none some seem to have preserved as a complete row of posts. A division could be made between a central and western part but this seems to be more based on the construction of different buildings from this settlement as on the actual construction of this building.

Type
As mentioned above the best guess is that this building is a type 2 building as well.

Pits
There seem to be no pits along the northern side of the house as if there was hardly enough space to dig such a pit if house 15 was contemporary. There are some pits to the south and west of the building. Pits 1760, 2301 and 1367 are closely together but both seem to relate to the house. Pit 1367 only contained some finds. It’s filling suggests a slow gradual filling process. Pit 1870 which is situated along the western side has an oval shape and while sectioning it became clear that it probably functioned 

Figure 20
House 16 with pits.
as a silo. In the bottom of the pits a layer of burned loam, which has been deposited at one occasion, is clearly visible (Figure 21). Because of the large fragments of burned loam it is thought that they would have belonged to part of an oven or fire place. The pit contained some finds. Pit 1760 yielded no finds at apart from some fragments of burned loam which lay scattered in the pit. An adze was found in pit 2301. Pit 1411 which is located further north and has to be considered an East pit. It has more or less the two distinct fillings and cuts through long pits of house 15. It also holds a considerable amount of finds.

Find material

Pits 1358 and 1470 contained pottery, flint, burned loam, bone and stone (Table 12). Pit 1411 also yielded finds. The other pits weren't sectioned or contained hardly any finds.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>1367 Amount</th>
<th>Weight (g)</th>
<th>Pit 1780 Amount</th>
<th>Weight (g)</th>
<th>pit 2301 Amount</th>
<th>Weight (g)</th>
<th>Pit 1411 Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>7</td>
<td>76.1</td>
<td>12</td>
<td>164.4</td>
<td>5</td>
<td>68.5</td>
<td>44</td>
<td>546.7</td>
</tr>
<tr>
<td>Flint</td>
<td>6</td>
<td>120.8</td>
<td>2</td>
<td>353.5</td>
<td>1</td>
<td>1</td>
<td>55</td>
<td>1401.3</td>
</tr>
<tr>
<td>Stones</td>
<td>2</td>
<td>18.9</td>
<td>3</td>
<td>240.9</td>
<td>17</td>
<td>880.9</td>
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<td></td>
</tr>
<tr>
<td>Ochre</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burned clay</td>
<td>4</td>
<td>117.8</td>
<td>12</td>
<td>97.5</td>
<td>50</td>
<td>655.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronology

Based on the decorated ware from pit 1470 and pit 1411 the house is dated to ceramic phase 15.
House 17

General remarks
Only a small part of house 17 has been excavated (Figure 22). However, it is the only building where without any doubt a wall ditch has been established. Along the southern side of the building are two pits.

Construction
Most of the building hasn’t been excavated so only a few remarks can be made about it’s size. The width is 4.73 m. The length can be partially estimated based on the long pit which suggest a length of over 12.3 m. The depth of the ditch is ca. 10 cm. Some of the wall posts within the ditch reach down to 31 cm.

Type
The western wall ditch indicates that this house is a type 1b or type 2b building.

Pits
Pit 22-4 is a long pit that was already found during the test trenching. Unfortunately it wasn’t sectioned than as it wasn’t during the excavation. However, some finds were gathered during the test trenching fase. The other pit (1202) was sectioned and contained some finds as well.

Find material
Some finds were retrieved during excavation but numbers are low (Table 13).

Figure 22
House 17 with pits.
Chronology

Although some finds have been retrieved, it wasn't enough to date this building.

<table>
<thead>
<tr>
<th>Find</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>11</td>
<td>78</td>
<td>2</td>
<td>8.6</td>
</tr>
<tr>
<td>Flint</td>
<td>13</td>
<td>395</td>
<td>5</td>
<td>59.1</td>
</tr>
<tr>
<td>Stones</td>
<td>9</td>
<td>1968</td>
<td>1</td>
<td>14.3</td>
</tr>
</tbody>
</table>
House 18

General remarks
House 18 is located in the south-eastern part of the excavation (Figure 23). Parts of it have already been found during the test trenching. During the excavation a small area was excavated revealing some more of the structure. The building has been disturbed by some Iron Age and recent ditches.

Construction
Because of the many disturbances it proved to be quite challenging to make out the construction of this building. Some wall posts and inner post are preserved. It nonetheless remains difficult to determine the size and shape of the building. It is thought that the building has a length of about 20 m. This would make it the longest building of the known settlement. The width is 6.5 m which is wider than all the other excavated buildings. The orientation is NWW-SSE. A number of pits lie in the vicinity of the building.

Type
There are no direct indications that would reveal the type of the building.

Pits
A number of pits can be related to this house. Long pits are certainly absent. Most pits are clustered to the south of the building. The number of pits (30) along the southern side of the building is remarkable. It is however uncertain which pits directly relate to the building. Most pits however are not sectioned. Four pits have been sectioned (2447, 2497, 2449 and 2454). Pits 2447 and 2449 are shallow pits which contain hardly any finds. Pit 2497 is evidently a silo pit. It has straight edges and a flat bottom. The filling is layered with some charcoal layers. On the bottom the charcoal layer indicates the burning of the pits to clean them for vermin and weeds. Pit 2449 might have been

Figure 23
House 18 with pits.
a silo as well. The same goes for pit 2454. The shape and size is an indication that the primary function used to be a silo. However, there seems to be a different secondary function as the bottom of the pit is filled with flint. More than 73 kg of flint was excavated in this pit. When looking in detail at the filling of the pit (Figure 25) it can be observed that the flint is all located at the bottom of the pit. This suggests that the flint was deposited in the pit in a relative short time span. After the deposition the pit gradually filled with rubble and loam as most pits do.

Find material
As said before most pits contained hardly any finds. Most finds belong to pit 2454 which not only contained the vast amount of flint but also contained some pottery and stones (Table 14). In pit 2447 a large grinding stone was found.
Table 14
Finds from pit 2454 and pit 2447.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Pit 2454</th>
<th>Weight (g)</th>
<th>Pit 2447</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>26</td>
<td>153</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flint</td>
<td>51</td>
<td>733.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stones</td>
<td>14</td>
<td>394</td>
<td>1</td>
<td>7500</td>
<td></td>
</tr>
</tbody>
</table>

Chronology

Pit 2454 contained enough decorated sherds to obtain a dating for the pit. It can be placed in ceramic phase 20.
House 19

General remarks
House 19 is located just south of house 16 (Figure 26). Only parts of this building has been excavated. Some features have already been found when test trenching. Most of the building remained unexcavated. Only a small number of features indicate the location of house 19 including some long pits. Especially the long pits was our best indication that there should be a building in the direct surroundings of these longpits. The building has been disturbed by a recent ditch.

Construction
Only a few wall posts were recognized as well as three inner posts. Some assumptions can be made from this scarce number of features. The length of the house might be as long as 11.96 m. The width could be 4.35 m. The orientation is NWW-SEE.

Type
There are no direct indications that would reveal the type of the building.

Pits
The long pit consist of the different pits (pit 21-1, 2363, 2304, 2493 and 2494) which lie elongated (Figure 27). The pits vary in size and depth reaching down to a maximum of 96 cm (pit 2304). The filling of the pits are almost similar to each other although their primary function differ. Pit 2494 is a long pit but pits 2304 and 1363 were silo’s. Based on it’s location we preferred pits 2494 and 1363 in direct relation to the house structure.

Pit 2311 is located within the structure. It is therefore not clear whether this pit belongs to the original yard or is dug after abandonment or even before the house was built.

Figure 26
House 19 with pits.
Find material
Most pits contained finds but pit 2304 contained the most (Table 15). The usual settlement refuge is present within the assemblage.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Pit 1363</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Pit 2304</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Pit 2494</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>9</td>
<td>50.4</td>
<td></td>
<td>30</td>
<td>297.9</td>
<td></td>
<td>9</td>
<td>64.6</td>
<td></td>
</tr>
<tr>
<td>Flint</td>
<td>6</td>
<td>145.6</td>
<td></td>
<td>39</td>
<td>737</td>
<td></td>
<td>11</td>
<td>255.5</td>
<td></td>
</tr>
<tr>
<td>Stones</td>
<td>5</td>
<td>90.6</td>
<td></td>
<td>11</td>
<td>391.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ochre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burned clay</td>
<td>20</td>
<td>301.8</td>
<td></td>
<td>38</td>
<td>1312.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chronology

The decorated pottery from pit 2304 initially places this house in ceramic phase 20 as well as the ceramics retrieved from pit 2494.
House 20

General remarks
Within the southern cluster of houses house 20 is located north of house 14 (Figure 28). A few of the posts have been preserved. None of the features have been sectioned. A number of pits surround the presumed structure. In the middle of the structure a large more recent pit is present.

Construction
Only a few wall posts were recognized as well as five inner posts. Some assumptions can be made from these features. The length of the house supposedly is 9.33 m. The width could be 4.18 m. The orientation is NWW-SEE.

Type
There are no direct indications that would reveal the type of the building.

Pits
Most pits haven't been sectioned. Only pits 948 and 949 have been sectioned. They presumably belong to the house. Both pits cut through some shallow pits. Pit 948 is a long pit which holds a vast number of finds. The layered pit indicates that the pit was filled with waste during a certain time span.

Find material
Pit 948 contained over 1000 sherds apart from flint, stone, charcoal and burned loam (Table 16). This vast number is probably because the pit fillings were sieved and the finds include also a lot of small finds which normally wouldn't be excavated if done by hand.
Table 16  
Finds from pit 948.

<table>
<thead>
<tr>
<th>Find Category</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>1158</td>
<td>4624.9</td>
</tr>
<tr>
<td>Flint</td>
<td>293</td>
<td>1695</td>
</tr>
<tr>
<td>Stones</td>
<td>448</td>
<td>4276.9</td>
</tr>
<tr>
<td>Ochre</td>
<td>5</td>
<td>8.4</td>
</tr>
<tr>
<td>Burned clay</td>
<td>22</td>
<td>395.8</td>
</tr>
<tr>
<td>Charcoal</td>
<td>72</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Chronology

The decorated pottery from pits 948 places this house in ceramic phase 14.
House 21

General remarks
South of the houses 11 and 12 we find house 21 (Figure 29). The house is only partially excavated. Most of it lies outside the excavation pits. Still some features have been found. Alongside the house there are some longpits. None of the features have been sectioned.

Construction
As so little remains of this house we can only make some assumptions about the length and orientation of the house. The length of the house supposedly is 13.1 m. The orientation is NWW-SEE.

Pits
As only the northern longside of the presumed building has been excavated some remarks can be made about the pits. Alongside the structure are three pits present including one longpit (pit 13.5/180). None have been sectioned and provided us with any finds.

Figure 29
House 21 with pits.
House 22

General remarks
In between the house 8 and 9 is house 22 located (Figure 30). This house is merely determined based on the location of three longpits on either long side of the house. Just three postholes were seen in the excavated plan. The north-western part of the building is disturbed by recent car tracks.

Construction
Based on the position and orientation of the longpits the orientation of the structure seems to be NW-SE. It length seems to be around 10 m or more but that remains only an educated guess.

Pits
Fortunately most of the pits have been sectioned. Only pit 2047 wasn’t sectioned. Pit 2039 is a large longpit reaching down to 93 cm below the excavation plane. It seems to consist of two or more longpits. The pits were gradually filled. Pit 2043 has a more distinct layered profile and is 52 cm deep. Pit 2046 is the shallowest with 29 cm.

Find material
All pits contained finds (Table 17). Most finds however came from pit 2039, it contained the usually waste assemblage.
The decorated pottery from pits 2039 and 2043 places this house in ceramic phase 12.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Pit 2039</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Pit 2043</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Pit 2046</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>94</td>
<td>927.3</td>
<td>20</td>
<td>174.1</td>
<td>6</td>
<td>64.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flint</td>
<td>58</td>
<td>946.7</td>
<td>39</td>
<td>576.7</td>
<td>8</td>
<td>19.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stones</td>
<td>15</td>
<td>813.6</td>
<td>4</td>
<td>576.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ochre</td>
<td>1</td>
<td>69.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 17
Finds from pits 2039, 2043 and 2046.
House 23

General remarks
House 23 is situated in the central area of the excavation (Figure 31). It consists of merely a few inner posts. No wall posts seem to have been preserved. This structure wasn’t identified as such in the field but fortunately almost all of the remaining features have been sectioned. The position of three pits suggested the presence of a building in between these pits.

Construction
The structure holds a two rows of inner posts, some of them were very difficult to be identified during the excavation. There are no traces of the central posts of the DPR’s, only some outside posts from two DPR’s remained. As it seems the length of the building would be 8.23 m long but presumably could be longer. The depth of the postholes reach down to 10 – 30 cm below the excavation plane. The feature’s colour is very bleak as is for most of the Bandkeramik postholes (Figure 32). Feature 643 seems to be the best preserved or at least recognizable. As is mentioned earlier it can be stated that although postholes are identified and recognized, probably more postholes were preserved but simply not identified in the field due to the bleak filling of the features but also bad weather conditions (rain or sunshine) which made it more difficult to spot the features.

Pits
There are three pits, one north of the building (640) and two positioned south (651 and 652). Pit 640 turned out to be a long pit. It has straight edges and a flat bottom and was 78 cm deep. Three different layers are visible: a charcoal layer at the bottom, a findless layer of gradual pit filling and a dark grey layer with finds and charcoal. Pit 652 is a shallow pit (15 cm) and held only some indistinct pottery fragments. Pit 651 is a silo.

Figure 31
House 23 with pits.
Figure 32
Sample of postholes of house 23.

Figure 33
Pits 640 and 651.
pit. It is 85 cm deep and has straight edges and a flat bottom as well. It’s layered filling suggests a fast but staged filling. A quern flint stone was found in one of the layers (Figure 33).

Find material
Both pits 640 and 651 contained finds like the quern stone in pit 651 (Table 18). Most finds however came from pit 640. It contains the usual Bandkeramik waste assemblage. Apart from that a large grinding stone was found in the pit.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>108</td>
<td>1199.1</td>
</tr>
<tr>
<td>Flint</td>
<td>20</td>
<td>179.2</td>
</tr>
<tr>
<td>Stones</td>
<td>11</td>
<td>6481.4</td>
</tr>
</tbody>
</table>

Chronology

The decorated pottery from pits 640 places this house in ceramic phase 16. A few sherds from pit 651 suggest even a younger phase (19). In hindsight we preferred the dating of pit 640 as the position of the silo pit 651 next to a house seems not appropriate and may as well belonged to another yard which overlaps with house yard 23.
House 24

General remarks
Just northwest of house 23 is house 24 located (Figure 34). It’s location is merely based on the location of two long pits and just three postholes. Most of the presumed building hasn’t been excavated and lies outside the excavation trench. During recent times a gravel road was constructed over the presumed position of the building. Only some remarks can be made about the pits, the postholes were just barely visible.

Pits
Both pits seem to have been longpits. Pit 2057 contained some finds and reached down to 60 cm below plane. Pit 2061 had the same depth and filling but contained more finds (Table 19).

Chronology
Just one decorated sherd was excavated. Clearly not enough to date the pit or the building.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Pit 2057 Amount</th>
<th>Weight (g)</th>
<th>Pit 2061 Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>45</td>
<td>460,8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flint</td>
<td>2</td>
<td>49,4</td>
<td>25</td>
<td>191,6</td>
</tr>
<tr>
<td>Stones</td>
<td>5</td>
<td>25,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charcoal</td>
<td>2</td>
<td>0,4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 19
Finds from pit 2057 and 2061
House 25

General remarks
House 25 is located hypothetically based on the presence of four long pits (1940, 1942, 1975 and 1984, Figure 35). There were been no posts found or recognized during the excavation. Two houses that lie in the vicinity (house 14 and 16) showed that the preservation of the features was poor. The same can be said for the four long pits where in between a building presumably has been present; the yard.

Pits
All four pits are presumably long pits. However, they are all shallow and seem to be eroded much. Pit 1987 is only 16 cm deep and contained only a few finds. The other pits varied in depth between 30 (pit 1942), 38 cm (pit 1940) and 42 cm (pit 1975). They all have a layered filling. Apart from the filling of 1942 they all seem alike. The pits contained substantially more finds than pit 1987. Based on the pottery analysis pit 1942 is not contemporary with the other pits and is a bit younger than the southern positioned pit. It might belong to another phase of use in the settlement.

Find material
Most finds from pits 1942 and 1975 were found in the top layer. They contained a lot of pottery, flint, burned loam, bone and stone including an adze (Table 20). One segment of the filling of pits 1940 and 1942 have been sieved.
Chronology

Based on the decorated ware four pits (1939, 1940, 1942 and 1975) could be dated. Pit 1939 was dated to ceramic phase 15. Pits 1940 and 1975 to ceramic phase 14. Pit 1940 doesn’t correspond quite well to the other three dated pits and is dated to phase 16.

Table 20
Finds from pits 1942 and 1975.

<table>
<thead>
<tr>
<th>Find category</th>
<th>Pit 1942</th>
<th>Weight (g)</th>
<th>Pit 1975</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>75</td>
<td>474.6</td>
<td>15</td>
<td>187.3</td>
<td></td>
</tr>
<tr>
<td>Flint</td>
<td>322</td>
<td>3778.5</td>
<td>34</td>
<td>963</td>
<td></td>
</tr>
<tr>
<td>Stones</td>
<td>14</td>
<td>447.2</td>
<td>1</td>
<td>185.4</td>
<td></td>
</tr>
<tr>
<td>Ochre</td>
<td>2</td>
<td>4.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td>7</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
House 26

General remarks
In the northern part of the excavated settlement is house 26 located (Figure 36). It consists of a few postholes as well as one pit. The features outlines are vague.

Construction
Only a few wall posts were recognized as well as five inner posts. Some global assumptions can be made from these features. The length of the house supposedly is 15.9 m. The width could be 5.9 m. The orientation is W-E.

Type
There are no direct indications that would reveal the type of the building.

Pits
Only one pit (369) seems to be directly associated with the house. The relation with pit 494 which is located approximately 4 m from the building is not clear. It could also be related to house 27, or both.

Find material
Pit 369 contained only a few sherds and some flint.

Chronology
Just two decorated sherds were excavated. Clearly not enough to date the pit or the building.

Figure 36
House 26 with pits.
House 27

General remarks
Just north of house 26 is house 27 situated (Figure 37). Although a lot of Iron Age features are present in this area, enough LBK features (which colour is more brown instead of the grey colour of the Iron age postholes) were recognised. The building is surrounded by a number of pits just like house 12, 18 and 20.

Construction
The recent and Iron age features disturb the Bandkeramik construction to some extent. Still, it is possible to get a general picture of the layout of the building. Wall posts from all sides of the building are preserved which gives a good idea of the length and width of the building. The building is 16.2 m long and 5.26 m width, covering a total area of ca 84 m. The shape is rectangular and the orientation NWW-SEE. The wall posts reach down to a maximum of ca 20 cm and the inner posts (DPR) to a maximum of 38 cm (feature 1882). A few rows of inner post can be reconstructed; one of them could be a corridor.

Type
The corridor divides the building in at least two parts which means that this is, at least a type 2 building.

Pits
A number of pits (pit 430, 433, 449, 450, 451/45-20, 465, 466, 467, 485 and 486) lie in the direct vicinity of the building. Some pits (pit 450, 451 and 466) produced some finds. Most pits however, haven’t been sectioned. When looking at the shape of the pits, 466 and 486 could be long pits. Pit 430 could be a silo but it is not sure if this silo dates in the LBK or Iron age. Pit 321 can be considered an East pit and yielded a large amount of finds.

Figure 37
House 27 with pits.
Find material
As none of the associated pits were sectioned almost no find material was excavated.
Out of the three pits (450, 451 and 466) just a few sherds, fragments of flint and stone is known. Pit 433 yielded some decorated pottery.

Chronology
Almost no decorated pottery was found but pit 433 yielded some which possibly dates to ceramic phase 17. Pit 321 is dated to ceramic phase 16.
House 28

General remarks
The small building of house 28 is located just north of house 7 (Figure 38). Two pits seems to be associated with the building.

Construction
The construction consists of nine postholes. Only feature 623, an inner post was sectioned. Only 18 cm of the feature remained. As mentioned, it seems that the structure is limited in size. It measures 4.5 by 3.8 m. Outside the small cluster of features no other post holes were found. As the preservation of house 7 seems to be very good it can be argued that if more post holes had been present they would have been recognised in this part of the excavated area.

Type
The small size of the building suggest that this is a type 3 building.

Pits
Pits 586 and 596 are associated with the building and are located south of the structure. Only pit 596 has been sectioned. The pit as a diameter of over 1 m. It is 58 cm deep. It filling indicate a gradual filling process.

Find material
Only a few finds haven been done originating from pit 596. These include a piece of pottery and stone as well as three pieces of flint.

Chronology
No decorated pottery was found in any of the pits making a dating impossible.
House 29

General remarks
The small building of house 28 is located in the northern part of the excavated settlement (Figure 38). Five pits seems to be associated with the building (2109, 2169, 2180, 2118 and 2121).

Construction
The construction consists of nine postholes. Several features were sectioned but only three features were positively identified as postholes (2171, 2173 and 2117). Depth ranged from 4 to 21 cm. As mentioned, it seems that the structure is limited in size. Although a lot of features are missing we estimate its size 10.65 by 4.2 m. Outside the small cluster of features no other post holes were found although some features are present but they have been documented as natural disturbances.

Type
Although its size seems to be small that is no indication for the type of the building being either a type 2 or type 3 house.

Pits
Pits 2109, 2169, 2180, 2118 and 2121 are associated with the building and are located either south or north of the structure.

Find material
Most finds come from pit 2180 which is a long pit. Although 46 sherds were found only two sherd families were decorated. Flint formed the largest part of the assemblage but also a high amount of stones were found. Only a few finds haven been retrieved from pit 2169. These include a piece of pottery as well as three pieces of flint. Pit 2109 and 2118 did not contain any finds.

Figure 38
House 29 with pits.
Chronology

Although some decorated sherds were found they are not really sufficient for a solid relative date.

<table>
<thead>
<tr>
<th>Findcategory</th>
<th>Amount</th>
<th>Weight (g)</th>
<th>Amount</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pottery</td>
<td>1</td>
<td>6.3</td>
<td>46</td>
<td>661.9</td>
</tr>
<tr>
<td>Flint</td>
<td>3</td>
<td>30.8</td>
<td>115</td>
<td>1991.9</td>
</tr>
<tr>
<td>Stones</td>
<td>52</td>
<td>116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ochre</td>
<td>1</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 21
Finds from pits 2169 and 2180.
Appendix 8 Catalogue of Iron Age house plans and outbuildings

**House 1 (structure 12)**

Investigation

House 1 is the only house plan from the Iron Age that was recognised as such in the field. The plan had already been cut into in trial trench 24. During the excavation, there were two clear rows of wall posts visible in work pit 61. The western end of the trench was later investigated in work pit 81. Contrary to the wall pieces, the centre of the structure was a lot less clear, though a deliberate search for traces of post pits was carried out within the plan.
The probable post features at the level of the plan were all sectioned. Some of these were thereby interpreted as natural disturbance. The other features were only relatively shallow. Possibly a part of the features interpreted as natural disturbance should after all be interpreted as post pit and thus are part of the house plan.

Construction
The plan is orientated west-northwest – east-southeast and measures ca. 25 x 6.4 m. The centre construction is irregular. The plan seems to have been entirely three-aisled, with two rows of inner posts. These were probably placed in pairs, though only one pair is more or less recognisable. The other features interpreted as inner posts are however positioned in a line. The depth of the inner posts varies from 5 to 22 cm. Most of the inner posts are relatively shallow (<10 cm).

Walls
The walls form the clearest part of this house plan. The wall posts were placed in pairs along the long sides and have a depth varying between 3 and 30 cm. There are possibly also wall posts present in the short sides. In general the wall posts seem to have been dug in deeper than the inner posts. Most wall posts are deeper than 10 cm, and have a rectangular shape in the section.

Entrances
No entrances were recognised.

Roof
The roof construction is not clear.

Special elements
Four pits were encountered inside the house plan: S1165; S1158; S1092, and S1142. Although not absolutely certain, it is probable that the pits belong to the same occupation phase as the house plan. Pit S1158 has not been excavated, possibly because it was interpreted as natural disturbance in the field. Pits S1092 and S1142 were relatively small with a depth of respectively 16 and 21 cm. Pit S1165 was larger and yielded a considerable quantity of find material, in particular pottery, stone and a bronze needle (fibula fragment?). The pit has a residual depth of c. 50 cm and is more or less bowl-shaped in cross-section. The function of this pit is unclear.

Disappearance of the building
No information is available. No cores of posts were visible in any of the post pits.

Dating
Typologically, house 1 can probably be classified as a variant of the type St. Oedenrode / Oss-Ussen 2. This type dates from the Late Bronze Age to the beginning of the Middle Iron Age.

The post pits of these plans yielded hardly any find material. In two post pits (S1093 and S1099) three sherds were found of no further determinable Iron Age pottery. Pit S1165 located in the centre of the plan yielded a large pottery complex, consisting of a total of 147 sherds. Based on the form types present, this material can be dated to the Early Iron Age.
House 2 (structure 47)

Investigation
House 2 was not recognised as such in the field. Only in the post-excavation analysis were (parts of) two rows of wall posts recognised which probably belonged to a house plan comparable to the one of house 1. Most post pits at the level of this plan were sectioned. Several of these were thereby interpreted as natural disturbance. The other features were only relatively shallow. Probably part of the features interpreted as natural disturbance should after all be interpreted as post pits. The house plan is not complete. The western short side seems to be present. To what degree the plan extends in an easterly direction is unclear because of recent disturbances. The presence of several pits east of the most easterly recognised pair of wall posts would suggest that the house plan did indeed continue in an easterly direction.
Construction
The house plan is orientated more or less west-northwest – east-southeast. The minimum length is c. 16.5 m, and the width is 6.3 m. The centre construction of this plan is even less clear than that of house 1. Several features were recognised between the wall posts which probably partly belonged to the centre construction of the house plan. No clear rows of centre posts are present.

Walls
As with house 1, the walls are relatively regular and consist of minimally 6 pairs of wall posts placed at regular distances. The wall posts are relatively shallow. Several of them were deselected after sectioning and interpreted as natural disturbance, but probably we are dealing with badly preserved wall posts. The residual depth of the clear wall posts varies between 13 and 18 cm.

 Entrances
No entrances can be recognised in the house plan.

Roof
The roof construction is not clear.

Special elements
Inside the reconstructed structure minimally one pit is present (S918). This pit is located more or less in the centre of the structure and has a more or less bowl-shaped cross-section with a flat bottom. The residual depth measures 38 cm. A large quantity of find material was present in this pit, in particular pottery, stone and burnt clay. Based on the flat bottom of the pit we could be dealing here with a storage pit.

Besides pit S918, there are also a number of pits (S904, S1140, S2032 and S2034) in the eastern part of the house plan. However it is not entirely certain whether these should all be ascribed to the use phase of the plan. Pit S904 was not investigated further as it falls partly outside the reconstructed walls. Pit 1140 was remarkable because it was largely filled with sherds of three coarse-textured storage pots. Pits S2032 and S2034 had a flat bottom and residual depths of respectively 30 and 20 cm.

Disappearance of the building
No data are available.

Dating
Typologically it seems that we are dealing here with a house plan that is comparable to house 1, i.e. type St. Oedenrode / Oss-Ussen 2.

The post pits of this plan did not yield any find material. The material of pit S918 could be dated to the first half of the Early Iron Age based on the characteristics of the pottery. The pottery of pit S1140 is dated to the Early Iron Age or at most to the beginning of the Middle Iron Age.

Based on the pottery it seems that this house can be dated to the first half of the Early Iron Age.
House 3 (structure 48)

Investigation
House 3 was not recognised as such in the field. The plan is located in a cluster of features in which also three LBK houses were recognised (houses 14, 15, and 16). Nevertheless, the Iron Age house plan is reasonably recognisable due to the two rows of regularly placed wall posts. Only a small part of the features was sectioned (two wall posts (S1406 and S1796) and three inner posts (S1397, S1400, and S1402)). The house plan possibly continues in an easterly direction to beyond the trench wall. The western end is also unclear because of the presence of LBK house 14.

Construction
The house plan is orientated more or less west-northwest – east-southeast. The minimum length is c. 19.5 m and the width varies between 6.4 and 6.9 m, whereby the western part of the plan is wider. As in house 1, the centre construction seems to have consisted of two rows of inner posts which were lying more or less in a line. Only in the western part are there possibly recognisable pairs of inner posts. The house plan thus seems to have to be interpreted as three-aisled.

Walls
As in house 1, the walls are relatively regular and consist of minimally 7 pairs of regularly placed wall posts.

Entrances
No entrances can be recognised on the plan.

Roof
The roof construction is unclear.
Special elements
Pit S1398 is located inside the reconstructed house plan. This pit was not investigated. It possibly concerns a storage pit as found in houses 1 and 2.

Disappearance of the building
No data are available.

Dating
Typologically house 3 is comparable to house 1, on the basis of which it can be dated to the period Late Bronze Age to Middle Iron Age.

The house plan yielded very little find material. When laying out the level a small quantity of pottery (13 pieces) was collected from pit S1398. This material could not be dated more accurately than “Iron Age”.
House 4 (structure 45)

Investigation
House 4 was not recognised as such in the field and probably lies partly outside the investigated area. The house plan consists of two (incomplete) rows of wall posts, a few post pits which cannot be placed and two pits. The presence of the house plan can mainly be inferred from the (as far as recognised) regularly placed wall posts. Only a few of the post pits of the plan were sectioned (S1031, S1033 and S1034). However, no documentation on these has been found.

Construction
The house plan is orientated more or less west-northwest – east-southeast. The minimum length is c. 11.2 m and the width is about 6.2 m. The centre construction is unclear. Between the two rows of wall posts are several post pits located which could have been part of the centre but it is unclear in which way.
Walls
As in house 1, the walls are relatively regular. There are two pairs of wall posts. In the southerly row there are another few extra wall posts which do not have a counterpart in the northerly wall.

Entrances
No entrances can be recognised on the plan.

Roof
The roof construction is unclear.

Special elements
Pits S1026 and S1027 are located inside the reconstructed house plan. Both pits should probably be associated with house 4. The pits have a more or less rectangular cross-section and have a depth of respectively 64 and 40 cm. On the bottom of pit S1026 was a layer with pottery fragments and other find material. It probably concerns storage pits in both cases.

Disappearance of the building
No data are available.

Dating
Typologically the house plan is comparable to house 1, on the basis of which it can be dated to the period Late Bronze Age to the beginning of the Middle Iron Age.

The post pits of this house plan yielded very little find material. Most material originates from pits S1026 and S1027. The pottery of these pits has been dated to the Early Iron Age to at most the beginning of the Middle Iron Age.
House 5 (structure 57)

Investigation
House 5 was not recognised as such in the field and probably lies partly outside the investigated area. The house plan consists of two (incomplete) rows of posts which were regularly placed. None of the post pits was sectioned. The plan lies among a cluster of Iron Age (silo) pits.

Construction
The house plan is orientated more or less east-northeast – west-southwest. The minimum length is c. 13.2 m and the width is about 4.7 m. The centre construction is unclear. Between the two rows of wall posts are several post pits which could have been part of the centre, but it is unclear in which way.

Walls
As in house 1, the walls are relatively regular. Three pairs of wall posts are present. There are a number of extra wall posts in the northerly row which have no counterpart in the southerly wall.

Entrances
No entrances were recognised in the house plan.

Roof
The roof construction is unclear.

Special elements
None.

Disappearance of the building
No data are available.
Dating

The house plan has been mainly dated on the basis of the colour and texture of the features and the location among a cluster of Iron Age pits. Typologically we could be dealing with a variant of the house type St. Oedenrode / Oss-Ussen 2. However, house 5 is slightly narrower than the other house plans of the Cannerberg. None of the post pits yielded any actually datable material.
Outbuilding 1 (structure 1)

Investigation
Outbuilding 1 was recognised in the field.

Construction
The plan is orientated more or less north – south and consists of 6 post pits. The dimensions are c. 6.5 x 4.1 m. The depth of the post pits lies between 10 and 16 cm. No entrances have been recognised.

Finds and dating
Post pit 878 yielded a small lump of not further determinable prehistoric pottery. The structure was further dated on the basis of the colour and texture of the infill.

Outbuilding 2 (structure 60)

Investigation
Outbuilding 2 was not recognised as such in the field. The structure lies scattered over two work pits (50 and 83), and intersects an LBK pit with much flint debris.
Construction
The plan is orientated west-northwest – east-southeast. It seems that the structure originally consisted of 6 post pits. One post pit is missing in the reconstruction of the plan. The structure measures c. 8.2 x 4.8 m. The post pits in work pit 50 were not sectioned; however, they were in work pit 83. The residual depth of the post pits there lies between 29 and 40 cm No entrances have been recognised.

Finds and dating
None of the features of this structure yielded any find material. The structure has been dated on the basis of the colour and texture of the infill.
Settlement dynamics on the Cannerberg

Archaeological Research of Bandkeramik and Iron Age settlements

I.M. van Wijk (ed.)